is shrunk and depauperized in North Asia, Europe, and North America, becomes at once intelligible, if we suppose that India and South Africa had *but a scanty mammalian population* before the Miocene immigration, while the conditions were highly favourable to the new comers. It is to be supposed that these new regions offered themselves to the Miocene Ungulates, as South America and Australia offered themselves to the cattle, sheep, and horses of modern colonists; but after these great areas were thus peopled came the glacial epoch, during which the excessive cold, to say nothing of depression and ice-covering, must have almost depopulated all the northern parts of Arctogæa, destroying all the higher mammalian forms, except those which, like the Elephant and Rhinoceros, could adjust their coats to the altered conditions."

June 17, 1873.

The Viscount Walden, F.R.S., President, in the Chair.

Mr. Sclater laid before the meeting the first sheets of a catalogue of the birds of the Neotropical Region, prepared by himself and Mr. Salvin, and shortly about to be published, under the title 'Nomenclator Avium Neotropicalium.'

The subjoined list shows the proposed arrangement, which had been based on Prof. Huxley's new classification; and the numbers appended to each order gave the number of species of the order known to the authors as occurring in the Neotropical Region, which thus appeared to contain not less than 3565 species:—

Subordo I. Aves carinatæ.

Series *Ægithognathina.*	Series *Desmognathina.*	Series *Schizognathina.*	Series *Dromæognathina.*
1. Passeres ...1976	4. Coccyges..... 214	11. Columbæ 66	19. Crypturi 36
2. Macrochires 444	5. Psittaci 142	12. Gallinæ 90	
3. Pici 116	6. Striges 37	13. Opisthocomi ... 1	
	7. Accipitres ... 114	14. Geranomorphæ . 57	
	8. Steganopodes 17	15. Limicolæ 73	
	9. Herodiones... 44	16. Gaviæ 53	
	10. Anseres 64	17. Pygopodes 9	
		18. Impennes..... 9	

Subordo II. Aves ratitæ.

20. Apteryges, 0.
21. Struthiones, 3.

During the revision of his collection, effected while this list was in preparation, Mr. Sclater had found it necessary to make numerous alterations in the nomenclature and arrangement of his Catalogue of

American Birds, published in 1862, and had also ascertained that two species had been introduced by him into the American avifauna on erroneous data. These were :—

(1) *Turdus subcinereus*, P. Z. S. 1866, p. 320, which had been founded on a faded specimen of *Colluricincla rufiventris*, of Australia.

(2) *Cnipolegus*, sp. 1238, p. 203 of Cat. A. B., which appeared to be a female of *Chasiempis sandwichensis*, of the Sandwich Islands.

Both these birds had been obtained from a dealer, whose localities were generally to be depended upon, marked "Chili."

A communication was received from Mr. R. Swinhoe, enclosing the following extract from a letter addressed to him by M. le Père David, C.M.Z.S., dated Yen Kiatsun (Province of Shensi), February 19, 1873 :—

"Depuis trois mois et demi je me trouve près ou parmi les montagnes du Shensi, au sud de Hoangho, non loin de Si-ghan-fou. Cette chaîne est plus importante que je ne croyais ; plusieurs de ses sommets vont à douze mille pieds d'altitude. Mais il y a un peu de forêts, et là vivent plusieurs des animaux que j'ai rencontrés au Setchuan occidental ; comme le *Budorcas*, le grand *Antilope edwardsi*, l'*Anurosorex squamipes*, le *Nyctogale elegans*, le *Martes flavigula*, &c. J'ai un *Hystrix* qui est peut-être de la même espèce que le vôtre du Fokien.

"Pour les oiseaux, je trouve ici un mélange des espèces septentrionales et de celles que j'ai trouvés plus au sud ; mais jusqu'ici, je n'ai, je crois, que trois espèces nouvelles :—

"1. Un *Ithaginis* un peu plus grand que le *Ithag. geoffroyi*, avec la poitrine cendrée et le bas des ailes d'un roux doré remarquable.

"2. Un *Pomatorhinus*, qui a la voix grave et forte pour le volume de l'oiseau, et dont la taille et les couleurs me rappellent votre *Pom. erythrocnemis* de Formosa.

"3. Un *Carpodacus*.

"J'ai déjà envoyé à Paris le signalement de ces trois espèces.

"Outre les Faisans à collier et sans collier qu'on trouve ici, je n'ai vu d'autre gallinacé que le *Ceriornis temmincki* et le *Pucrasia xanthospila*, les deux rares.

"Des oiseaux sédentaires du nord, je suis étonné de trouver ici le *Pterorhinus davidi*, le *Rhopophilus pekinensis*, le *Carpodacus davidi*. Quant à ceux de Moupin j'ai en ici le *Pterorhinus*? (il faut un nom générique différent) *lanceolatus*, le *Trochalopterum ellioti*, le *Mecistura fuliginosa*, le *Parus monticola*, le *Siva cinereicapilla*. Le *Garrulax perspicillatus* est très-abondant dans la plaine et jusqu'au nord du Hoangho.

"Le nombre total des oiseaux que j'ai observés dans le Shensi méridional pendant cet hiver, ne monte qu'à 192 espèces. Les *Accentor* sont l'*Acc. multistriatus* et l'*Acc. montanellus*.

"Outre le *Picus mandarinus*, abondent ici les *Picus guerini* et *P. mandarinus*. En fait de rapaces nocturnes, je n'ai en que votre

Athene plumipes. J'ai rencontré aussi le *Sitta sinensis* et le *Suya striata*, les *Ruticilla aurorea* et *hodgsoni*, et les *R. leucocephala* et *fuliginosa*, le long des torrents.

"Les *Henicuri sinensis* et *scouleri* se voient aussi dans les cours d'eau des montagnes en compagnie du *Cinclus pallasi*. C'est le *Garrulus sinensis*, et non le *G. brandti* qui vit en petit nombre dans ces montagnes. Aucun *Ixos* n'est ici maintenant, et aucun autre *Sturnus* si ce n'est le *S. cinerascens* qui est extrêmement abondant. Le *Carpodacus pallasi* (que vous avez par distraction omis dans votre catalogue) hiverne dans ces montagnes en grand nombre, en compagnie des *Emberiza castaneiceps* et *E. ciopsis*.

"A propos d'omissions, je ne sais pas pourquoi vous avez laissé de côté dans votre liste l'*Aquila nævia*, dont il y a à Pékin un exemplaire en tout pareil à celui d'Europe, et le *Circaëtus orientalis*, que j'ai vus et touchés moi-même—sans doute par distraction aussi.

"De mon côté, je vois déjà bien des omissions et des inexactitudes dans ma liste des oiseaux du Nord de la Chine, faite de mémoire et à la hâte au moment de mon départ de Paris. Je me propose de mieux faire plus tard, en mettant ensemble mes notes et observations: il me faut pour cela du loisir et du repos, comme j'espère en avoir, s'il plait à Dieu, à la fin de cette campagne. Si, à cette époque-là vous êtes encore à Ningpo je me ferai un plaisir d'aller vous y voir."

Mr. J. W. Clark, F.Z.S., exhibited a skull of a Seal sent from San Francisco in 1872, along with a skeleton, by Lord Walsingham, a skull of a Seal from Newfoundland, and a series of skulls of *Phoca vitulina*, from the English coast, and made the following remarks:—

"In the Society's 'Proceedings' for 1864 (p. 27) Dr. Gray described from a single skull a new genus and species of Seal from Vancouver's Island, for which he proposed the name *Halicyon richardi* *.

"The British Museum now possesses, in addition to the type of Dr. Gray, the complete skeleton of a second individual of the species.

"Dr. Gray's chief specific characters are certain peculiarities in the conformation of the lower jaw, especially the thickening of the bone from the apex backwards, and the size of the tubercle at the hinder angle.

"He also remarks (p. 29) on the concavity of the hinder edge of the palate, which he contrasts with the 'angularly cut' form of *Phoca vitulina*. Now, if a considerable series of skulls of *Phoca vitulina* be examined, it will be seen that these characters are not of any constant value.

"In some specimens they will be found as clearly marked as in Dr. Gray's typical *Halicyon*, while others offer various modifications of them. Even the peculiar conformation of the entering angle of the palate in front is not always precisely the same. In all other characters, such as general conformation, dentition, and size, the Seal

* N.B.—Lege *richardsi*, the name having been given, I believe, after the Hydrographer to the Admiralty.—Ed.

from San Francisco agrees with a skull from Newfoundland, and with normal skulls of *P. vitulina* from the English coast.

"The thickening of the lower jaw may be a sexual distinction.

"A skull, unquestionably of a male, possesses it in a marked degree, while that of a female, apparently of nearly the same age, is slender.

"I am therefore disposed, so far as present evidence goes, to consider the so-called *Halicyon richardsi* simply a synonym of *Phoca vitulina*."

Mr. Sclater read a paper on the Curassows, based mainly upon specimens now or lately living in the Society's Gardens, and containing details on their geographical distribution and on the variations of sex of the known species.

This paper will be published in full in the Society's 'Transactions.'

Dr. A. Leith Adams read a memoir on the osteology of the Maltese fossil Elephants, in which was given the description of a large collection of remains discovered by him in Malta in the years 1860–1866. Dr. Adams referred these remains to two distinct species—a larger (*Elephas mnaidriensis*) and a smaller (the *E. melitensis* of Falconer), and assigned *E. falconeri* of Busk to a smaller form of the latter species.

This paper will be published in full in the Society's 'Transactions.'

Mr. Sclater exhibited a series of new and rare birds, which had been transmitted to him for examination by Signor d'Albertis, and which formed part of the extensive collection of natural history made in New Guinea by that gentleman during his recent expedition in company with Signor Beccari. Amongst these were examples of both sexes of a new Paradise-bird belonging to the Epimachine section of the group, which Mr. Sclater proposed to name *Drepanornis albertisi*, after its discoverer, and native skins of an apparently new species of true *Paradisea*.

These birds had been forwarded to Mr. Sclater through the intervention of Dr. G. Bennett, F.Z.S., of Sydney, who had translated Signor d'Albertis's notes respecting some of the more remarkable species as follows:—

1. Parotia sexpennis.

Although this species has been described many years, it is not yet accurately understood, having only been described from birds in a mutilated condition. My observations have been made in the natural haunts of these elegant birds, from numerous specimens both living and dead.

These birds are found in the north of New Guinea. I met with them about 30 miles from the coast, at an elevation of 3600 feet above the level of the sea, near Mount Arfak. I have never found

the adult male in company with females or young birds, but always in the thickest parts of the forests. The female and young male birds I have generally found in a much lower zone.

This Paradise-bird is very noisy, uttering a note like "*Gnaad-gnaad.*" It feeds upon various kinds of fruits, more especially on a species of fig which is very plentiful in the mountain-ranges; at other times I have observed it feeding on a small kind of nutmeg. To clean its rich plumage, this bird is in the habit, where the ground is dry, to scrape, like a gallinaceous bird, a round place clear of all grass and leaves, and in the dust produced by the clearing to roll over and over again—at the same time crying out, extending and contracting its plumage, elevating the brilliant silvery crest on the upper part of the head, and also the six remarkable plumes from which it derives the specific name of *sexpennis*. On seeing its eccentric movements at this time, and hearing its cries, one would believe it to be engaged in a fight with some imaginary enemy. This bird is named "*Coran-a*" by the natives. I have also a skeleton of a young male of this species, which, although not in a perfect state, may no doubt be interesting as showing the form of the cranium, on which there is an admirable muscular structure which enables the bird to elevate the feathers of the head. The feathers at the nape of the neck exhibit, when the rays of light strike upon them, a rich and brilliant metallic hue. The eyes are of a light blue, with a circle of a pale yellowish green colour.

2. Lophorina atra.

This bird, like the preceding, is very little known except from imperfect specimens. It is found in the same mountains as the last-named species, and feeds upon similar fruits. It flies from branch to branch in the forests, uttering a cry of "*Nied-Nied,*" and from this peculiar note is named by the natives "*Niedda.*" The muscles used in the elevation of the crest of *P. sexpennis* are surprising, but are surpassed in size by those of this bird; for with them it can extend, contract, elevate, and depress the long velvety feathers which, commencing a little below the occiput, extend along the body like a mantle; and when these are elevated the two feathers, horns, or tufts at the root of the beak are raised at the same time.

3. Epimachus maximus.

I can only send a young bird of this species. It lives on the highest mountains, and is very common there, according to the statement of the natives, but was very rare in the district I visited. It feeds upon fruits.

4. [Drepanornis albertisi, sp. nov.*]

This will probably prove to be a new bird, both generically and specifically. It is very rare, and many of the natives did not know it; but others called it "*Quarna.*"

* Vide *infra*, p. 560.

The peculiarity of this bird consists in the formation of the bill and head, and in the softness of the plumage. At first it does not appear to have the beauty peculiar to other birds of this class; but when observed more closely and in a strong light, the plumage is seen to be rich and brilliant. The feathers rising from the base of the beak are of a metallic green and reddish copper colour; the feathers of the breast when smooth are of a violet-grey, when raised form a semicircle round the body, reflecting a rich golden colour. Other violet-grey feathers arise from the flanks, which are edged by a rich metallic violet tint; and when the plumage is entirely expanded, the bird appears as if it had formed two semicircles around itself, and is very handsome. The tail and wing-feathers are yellowish; underneath they are of a darker shade. The head is barely covered with small round feathers, which are rather deficient at the back of the ears; the shoulders are tobacco-colour, and under the throat black blending into olive. The breast is violet-grey, banded by a line of olive, the rest white. The beak is black, eyes chestnut, and the feet of a dark leaden colour.

This species is met with in the vicinity of Mount Arfak. Its food is not known, nothing having been found in the stomachs of those prepared except clear water.

5. [PARADISEA RAGGIANA, sp. nov.*]

The mutilated skins of this bird resemble those of the Red Paradise-bird of Waigiou, but differ in some particulars. I procured them at Orangeisa Bay, where *P. papuana* and *P. apoda* are not known to the natives, judging by their surprise when I exhibited some skins of those species. Should the present bird prove to be new, I should wish it to be named after the Marquis Francis Raggi, a great lover of natural history, and especially of ornithology.

6. DIPHYLLODES SPECIOSA (Bodd.).

This bird is very rare in the mountains, but more numerous on the plains and near the coast; still I could not obtain any adult males, and could only procure a few skins prepared by the natives. The skins sent will probably be interesting.

7. [OTIDIPHAPS NOBILIS, Gould.†]

This is a very interesting and a rare bird, even should it not be new. I met with three specimens in the forest, but could only

* The two imperfect skins of this species sent seem to prove that it is decidedly distinct from *P. rubra*, as supposed by Signor d'Albertis, and in fact more nearly allied to *P. apoda* and *P. minor*, having the two abnormal central rectrices rounded as in the two latter, and not concave with one side open as in *P. rubra*. But it agrees rather with *P. rubra* in the colour of the great lateral pectoral tufts, and in having a distinct though narrow yellow band (like the back) interposed between the green throat and dark breast. As regards the head, however, the green front is quite narrow as in *P. minor*. I have named this Paradise-bird *P. raggiana*, in compliance with its discoverer's wishes.—P. L. S.

† Gould, Ann. Nat. Hist. ser. 4, vol. v. p. 62. It is of importance to have ascertained the exact locality of this remarkable bird.

procure this single female. It is usually found in low scrubs, runs with great rapidity, and conceals itself rapidly. When running, the tail is carried erect, and spread out like a fan; and the note it utters resembles that of the Goura Pigeon (*Goura coronata*). It feeds on small roots of plants and land shells.

The new form of Paradise-bird was then characterized by Mr. Sclater as follows :—

DREPANORNIS *, gen. nov.

Rostro tenui, valde compresso, arcuato, plus quam duplo longiore quam caput : mandibula superiore longiore : fronte media, oculorum ambitu et capitis lateribus denudatis ; pectore fascia duplici plumarum magna, utrinque ornato : cauda modice elongata, rotundata.

Sp. typica et unica D. ALBERTISI. (Plate XLVII.)

Mas *supra brunneus ; alis intus obscuris, extus dorso concoloribus, secundariis vegetioribus, cauda tota cum uropygio pallide castanea : pilei plumis brevibus, squamosis ; loris velutino-nigris, supra oculos æneis, et in fasciculum cupreo-purpureum utrinque exsurgentibus : subtus obscure griseus, purpureo lavatus : gutture toto plumulis squamosis velutino-æneis cupreo splendentibus obsito : fasciculis plumarum pectoralibus utrinque duobus, densis, elongatis, altero superiore, extus colore pectoris, sed cupreo nitidissimo intus ornato ; altero inferiore, purpureo lavato et cæruleo nitidissimo terminato : vitta infrapectorali angusta splendide viridi : ventre medio crissoque albis : alis elongatis, remigibus quinto et sexto æqualibus et longissimis : rectricibus gradatis, mediis externas uno pollice excedentibus : tarsorum squamis fere obsoletis : rostro nigro : iride castanea : pedibus saturate plumbeis : long. tota* 13, *alæ* 6, *caudæ rectr. med.* 5·5, *ext.* 4·4 ; *rostri a rictu linea direct.* 3, *curvati a fronte* 3·3 *poll. Angl.*

Femina *supra brunnea, cauda omnino pallide castanea : subtus dilutior, nigro frequenter transfasciata, ventre medio et crisso immaculatis, ochraceo-rufescentibus : gutture obscuro creberrime punctato.*

Hab. Papua borealis ad alt. 3000 ped. loco Atam dicto.

Obs. Forma *Epimacho maximo* forsan proxima, sed rostro elongato arcuato et cauda breviore rotundato distinguenda.

The remaining new birds in this remarkable collection Mr. Sclater proposed to describe at the next scientific meeting of the Society.

The following papers were read :—

* δρεπάνη, *falx*, et ὄρνις, *avis*. The term originally suggested was *Drepanephorus*; but this has been changed to *Drepanornis* (*cf.* Nature, July 3, 1873, p. 192) in consequence of the former having been recently used by Sir Philip Egerton for a genus of fossil fishes.—P. L. S.

1/2

J. Smit. lith. M & N Hanhart imp.

DREPANORNIS ALBERTISI, ♂ et ♀.

1. On the Distribution of the different Species of Deer and other Ruminants in Northern California and Oregon. By Thomas, Lord Walsingham.

[Received April 18, 1873.]

After leaving San Francisco, as soon as the less thickly settled country to the north in the direction of Mendocino County was reached, *Cervus columbianus* (the Black-tailed Deer) was met with. Throughout Sonoma, Mendocino, Colusa, Tehama, and Shasta Counties I observed no other species, although I have been informed that in parts of the last-named county bordering on the Upper Sacramento or Pit River *Cervus leucurus* (the White-tailed Deer) is not uncommon. In Siskiyon County, north-east of Mount Shasta, I first found *Antilocapra americana* (the American Antelope) and *Cervus macrotis* (the Long-eared or Mule Deer). These two animals and *Cervus columbianus* I found sparingly represented wherever the nature of the country was suitable to them, on my journey round the south and east of Klamath Lake, as far as its north-eastern point.

About the head of Pit River, and on Lost River, in the Modoc country, *Ovis montana* (the Big-horn, our mountain-sheep) occurs; but I failed to obtain a specimen, although I saw traces of a small band in the latter locality.

After leaving Klamath Lake, as I proceeded in a northerly direction along the plains about Klamath Marsh, towards the head of the Deschuttes river, *Cervus leucurus* was occasionally to be found, and abundance of the Prongbuck, which seemed here to frequent the edges of the timbered tracts during the day, coming out upon the plains to feed. *Cervus macrotis* was also plentiful, but entirely confined to the woods.

About the sources of the Deschuttes river, on the eastern slope of the Cascade range, I had good opportunities of observing the habits of *Cervus leucurus*; and I should mention that the specimens seen there, although I failed to obtain a full-grown male, were larger than those afterwards met with further north, and carried finer heads. They appeared to frequent the thick willow-clumps and other brushwood bordering the streams and swamps. They were extremely difficult to distinguish among the foliage, and remarkably quick when alarmed. As they bound off over logs and fallen trees, or dash through the thicket, they have a habit of swinging their broad white tails with a conspicuous flourish, which becomes annoying to a sportsman, to whom they never afford any thing but a snap shot, which is very apt to fail.

On Diamond Peak, at the summit of the Cascade range, *Cervus leucurus* did not occur; and as the snow was just beginning there, there were but few of *C. macrotis* and *C. columbianus* which had not already left the thick timber and descended to lower elevations in search of more genial winter-quarters.

After leaving the Cascade range in a north-easterly direction, following the valley of the Deschuttes river, I saw no more of *C. colum-*

bianus, and am led to think that they are somewhat less hardy than the other species, and that they retire for the winter down the western slope of the range towards the warmer region of the Willamette valley; while the others, for the most part, go east towards Crooked River. Indeed the evidence of this, consisting of the tracks of large numbers of Deer which had just gone down on both sides of the summit, was tolerably conclusive.

On Diamond Peak I first saw a track of *Cervus canadensis* (the Elk or Wapiti).

Both in Oregon and California, as far as I have observed, as well as from information derived from hunters, it appears that all Deer are accustomed to different winter- and summer-quarters, their migrations varying in different localities according to the severity of the season.

In many places they are known to travel sixty or eighty miles in making these changes; and very few specimens are to be found during the summer in the districts which afterwards become their winter-quarters; and scarcely any remain during the winter in the higher elevations to which they betake themselves for the summer months.

After reaching the junction of the Deschuttes with Crooked River, I followed as nearly as possible the course of the latter to its main source, in the neighbourhood of a range which forms, as it were, a spur or offshoot of the Blue Mountains, and overlooks on the one side the alkaline plains, probably represented on some maps as Spring Valley, and on the opposite side, in the direction of Harney Lake, the site of a deserted military post, formerly called Camp Curry, and the head of Silver Creek; but all the maps to which I have had access are very incorrect as regards this unsurveyed country. Along the course of Crooked River, *C. leucurus* in the valleys, and *C. macrotis* on the hills, with *Antilocapra americana* on the more open plains, were the species met with. *C. macrotis* was very abundant on the ridge last mentioned, where, for the first time, I noticed that it left the timber, and was to be found in rocky corries on the more open hills, where the only tree was a species of *Cupressus*.

On the road between Fort Harney (north of Harney Lake) and Cañon City, on the spurs of the Blue Mountains, at the beginning of November, *C. leucurus* and *C. macrotis* were both abundant, travelling west in search of winter-quarters; the former much smaller than those before met with.

At Camp Watson, in the valley of the middle fork of John Day's River (a deserted military post where I passed the winter), large numbers of *C. macrotis* were seen during November passing along the timbered mountains in a N.W. direction; but later in the winter not one was to be found; and, probably owing to the unusual quantity of snow, *C. leucurus* (again the small variety), which was very abundant early in the winter on the heads of the creeks which run into John Day's River, appeared also to be driven down lower.

Between Camp Watson and Cañon City, on the high open ridges which stand out from the timbered range, *Ovis montana* frequented

the sunny slopes at the edge of the deep snow-line during the winter; and I have seen, upon the same hills, but rather more frequenting the clumps of firs and of *Cupressus*, as many as two hundred or more of *Cervus macrotis* in a single day.

On the opposite side of the river is a higher and more thickly timbered ridge, separating the two forks of the John Day's, upon which are to be found at certain seasons a considerable number of *Cervus canadensis*.

After experiencing great difficulty, owing to the severe snow-storms and the depth of the slightly crusted snow, I was able to fall in with a few scattered members of the large herds, which had left tracks on their journey west, and to secure one fine head.

In the spring, going from Camp Watson to Fort Dalles, on the Columbia river, *Ovis montana* and *Antilocapra americana* only were to be met with, except about the head of Bridge Creek, where we found *Cervus macrotis*, now beginning to return in large numbers, having for the most part shed their horns.

After this time, following down the Columbia river to Portland, and through the Willamette valley south, I reached in June the Rogue-River Mountains and the Siskiyon range, and struck out on to the coast at Crescent City. In both these ranges *Cervus columbianus* was the only Deer I saw; but *C. canadensis* certainly does occur in places, although now gradually becoming exterminated. Bears are also very abundant; but *Ursus horribilis* (the Grizzly Bear) was not to be found; and, indeed, I have only on two or three occasions met with the track of this species (which is easily distinguishable), once on Mount Shasta, once on the Cascade Range, and subsequently in Humboldt County, and have failed in every attempt to obtain a specimen.

Passing south along the coast from Crescent City to Eureka, I saw again *Cervus canadensis*, and what I suppose to be only a small variety of *C. columbianus*, which here seems to attain a growth very much inferior to those in the neighbourhood of Mount Shasta and the Nevada range. The horns have seldom more than four points each; and I have heard it suggested that the species is different. I very much regret that my opportunities of preserving skeletons of *Cervus columbianus* were neglected, in the hope of more convenient ones occurring, and that I was thus deprived of the pleasure of adding specimens of it to my collection, which is now at the Cambridge Anatomical Museum.

I have, however, skins of all the animals mentioned in this paper, showing the summer and winter coats of some of them.

I ought, perhaps, to add that the hunters who were with me reported two varieties of Black-tailed Deer about the head of Trinity River, and in the district south-west of Mount Shasta—the mountain variety having very fine horns, often with a great many points, but being lighter in average weight than that which was to be found on the lower levels and about the banks of the streams. These latter were said to have shorter limbs, and not usually such good heads; but the evidence on this subject was not conclusive or reliable.

2. Descriptions of new Species of Land and Marine Shells from Australia and the Solomon and Louisiade Islands. By J. Cox, M.D., C.M.Z.S.

[Received May 16, 1873.]

(Plate XLVIII.)

HELIX ALLASTERI, sp. nov.

Shell with a deep narrow concealed umbilicus, semiglobose, smooth, transversely very finely striated with lines of growth; the whorls of the apex also longitudinally finely striated, translucent, pale straw-coloured, ornamented above and below with numerous rather narrow opaque white and clear bands; whorls 5, rapidly increasing in size, the last much inflated and obtusely carinated, not depressed in front, convex above and below; aperture ovately rounded, subangulated at the periphery, showing the opaque and clear zones within; peristome smooth and shining; lip very broadly expanded and reflexed; margins approximate, upper attached to the carina of the body-whorl, columellar broadly dilated, overhanging and concealing the umbilicus.

Diam., greatest 0·98, least 0·64; height 0·60 of an inch.

Hab. Solomon Islands (*mus. Cox*).

This beautiful species may be at once distinguished by the very peculiar alternate opaque white and clear zones. Amongst a large number of specimens procured I have not found one to vary in this respect.

(The specimen sent was so broken in transit that it could not be figured.—ED.)

HELIX (CAMÆNA) ARTHURIANA, sp. nov. (Plate XLVIII. figs. 1, 1 *a*.)

Shell globosely depressed, largely and openly umbilicated, very dark chestnut, almost black, lighter at the apex, transversely finely striated; whorls 6, very gradually increasing in size, last sharply depressed in front; suture conspicuously margined below with white; spire bluntly convex; base somewhat flattened; aperture ovately lunate, livid within, margins closely approximate, joined by a thin callus; peristome straight, expanded and reflexed, of an intensely dark livid purple colour; columellar margin triangularly dilated, overhanging the umbilicus.

Diam., greatest 1·28, least 0·90; height 0·77 of an inch (*mus. Hargraves*).

Hab. L Island, Torres Straits, North Australia.

More closely allied to *H. o'connellensis*, Cox, than to any other species. It is more globose, and it has not the excavated base round the umbilicus so characteristic of that species; the aperture is also much more round, with the margins more approximated.

HELIX (CAMÆNA) RAWNESLEYI, sp. nov. (Plate XLVIII. fig. 2.)

Shell broadly coniform, openly umbilicated, obliquely finely striated


1


8


1a


4


5


2


3


5a


6


6a


7


9


10

Helena Forde del. Sowerby del. Sowerby lith.

M&N Hanhart imp.

NEW LAND AND MARINE SHELLS

throughout, very dark chestnut, lighter towards the apex, which is ornamented with very narrow spiral bands; spire raised, bluntly conoid; whorls $7\frac{1}{2}$, convex; margin of suture faintly lined with white below; last whorl deflexed in front, base flattened; umbilicus large, half closed by the reflexed expansion of the columellar margin; aperture ovately lunate; margins much approximated, joined by a thin purple callus; peristome everted, of a dark livid purple, as is also the interior of the aperture; columella triangularly dilated.

Diam., greatest 1·68, least 1·25; height 1·58 inch.

Hab. Mount Elliott, near Port Denison, Queensland, North Australia.

Helix (Camæna) challisi, sp. nov. (Plate XLVIII. fig. 3.)

Shell solid, heavy, umbilicated, depressedly orbicular, closely finely striated, of a waxy yellow colour, ornamented by six or more rather narrow dark chestnut bands of irregular sizes and distances apart, dark around the umbilicus; spire moderately raised, bluntly convex; whorls 7, convex, very gradually increasing in size, last shortly deflected in front; aperture ovately lunate, margins slightly approximating, joined by a thin callus, interior of aperture showing dark lines of ornamentation; peristome straight, pure white, slightly thickened and reflexed, columellar margin triangularly expanded, half covering the rather narrow umbilicus.

Diam., greatest 1·22, least 0·89; height 0·90 of an inch.

Hab. L Island, Torres Straits (*mus. Hargraves*).

The present adds another to the large number of species recorded of the *Camæna* type of Australian land-shells, most of them being extremely limited in their habitats, every island almost in Torres Straits possessing its own special species.

Helix (Corasia) balcombei, sp. nov. (Plate XLVIII. fig. 4.)

Shell imperforate, depressed, almost flat above, convex below, very thin, glossy, pale straw-coloured, coarsely striated above and below with regular oblique transverse striæ, and longitudinally with strongly marked very slightly waved striæ, giving by their decussation a granular appearance to the surface of the shell; spire scarcely raised, suture impressed; whorls 4, slightly convex above, rapidly increasing in size; last whorl inflated below, and very prominently and sharply keeled, the keel edged with an opaque white line, base rounded; aperture large, subtrapezoidal, acutely angled at the periphery; peristome slightly thickened and everted, upper margin attached to the carina of the last whorl; columella dilated, appressed, and indented over the umbilical region.

Diam., greatest 1·09, least 0·78; height 0·48 of an inch.

Hab. Solomon Islands (*mus. Hargraves*).

This species appears to be closely allied to *H.* (*Caracolla*) *papyracea*, Brod.

Helix leei, sp. nov. (Plate XLVIII. figs. 5, 5*a*.)

Shell with a large, open, funnel-shaped umbilicus, thin, translucent, globosely depressed, of a dark cinnamon-brown colour,

transversely rather coarsely striated throughout, and covered above and below with oblique rows of prominent rather coarse setæ; spire slightly raised, bluntly convex; suture deeply impressed; whorls 5, convex, gradually increasing in size, last somewhat inflated, rounded below, excavated round the umbilicus, and gradually depressed in front for half the circumference of the whorl; aperture transversely oval, lip broadly expanded and slightly thickened, triangularly dilated at the columella, the outer margin of which overhangs the umbilicus; margins of aperture joined by a thin callus.

Diam., greatest 1·21, least 0·95; height 0·76 of an inch.

Hab. Louisiade Islands, on the north-east coast of Australia.

This species has the general aspect of a large specimen of *H. erinaceus*, Pfr.

Helix (Geotrochus) redempta, sp. nov. (Plate XLVIII. figs. 6, 6 *a*.)

Shell orbicularly convex, imperforate, obliquely finely striated from above downwards and backwards with straight striæ, and on the last two whorls from behind forwards with interrupted malleated striæ, of a dull opaque white colour, apex pink, variously ornamented with irregular dark chestnut spots, or with two or more regular broad bands; spire bluntly coniform; whorls 5, slightly convex, last sharply keeled and shortly deflected in front, base flattened; aperture quadrilateral, beaked at the periphery of the last whorl, margins joined by a thin pink callus; peristome pink, narrowly reflexed; columella broadly dilated, blending with the pink callus joining the margins, and occluding the umbilicus.

Diam., greatest 1·09, least 0·84; height 0·72 of an inch.

Hab. Solomon Islands.

The present shell is one of three specimens of *Helix* submitted two or three years ago to Mr. G. F. Angas for identification, one of which was pronounced to be *H. louisiadensis*; a second was labelled as a dead, very much worn variety of *H. fringilla*; and the third, the one I am now describing, was sent back as a variety of *H. eros*.

Examples of the first I circulated under the title of *H. louisiadensis*; but Mr. Angas on further comparison of the specimens has recently determined that it is a new species, which he has named *H. philomela*. The figure, however, given by him is that of the rarest variety, and cannot be regarded as the ordinary representative of the species. It is found abundantly at the Louisiade and the Solomon Islands; and the prevailing colour is white with a dark black edge behind the reflexed lip, "a pigment-like deposit."

The shell labelled as "a dead, very much worn variety of *H. fringilla*" I saw could not on any pretence be admitted to be such; and, trusting to Mr. Angas's diagnosis of *H. louisiadensis*, I considered it new, and described it as *H. millicentæ* in these 'Proceedings' for 1871. I now find that it proves only to be a very rare variety of *H. louisiadensis* with a white lip, as in this particular it differs from a number of specimens recently received by me of this hitherto rare species.

The third specimen, at the time unique, which was sent back to me as a large variety of *H. eros*, I venture to describe as a new species; for there are now many fine examples in the collection of Mr. Hargraves, from the constancy of the characters of which I am enabled to exhibit a specific distinctness from others of the group.

HELIX (GEOTROCHUS) MACFARLANEI, sp. nov.

Shell imperforate, thin, globosely conical, smooth, white, ornamented with one broad black band encircling the last whorl at the middle, and a broad blackish-brown zone round the umbilical region, also with dark brown or black interrupted broad zigzag lines running interruptedly across the last three whorls, with additional isolated irregularly disposed round black spots, principally on the body-whorl; apex pale, denuded of colour; transversely finely striated above and below, and concentrically striated at the base; whorls 6, rounded, gradually increasing in size, last slightly deflected in front at its termination, base convex; aperture obliquely ovate-lunate; peristome slightly thickened and everted, margined internally with white, and externally with orange; interior of aperture tinged with orange, the external dark band on the body-whorl showing through; margins approximating, joined by a very thin callus; columella dilated externally, adnate over the umbilical region, internal margin descending, straight.

Diam., greatest 0·92, least 0·68; height 0·72 of an inch.

Hab. Solomon Islands (*mus. Cox*).

I have named this very beautiful species after its discoverer, Captain Macfarlane, who has taken much trouble to collect the shells from the above group, and whose careful observation has greatly assisted in obtaining their correct habitats. It is somewhat allied to *H. coxianus* of Angas.

(The specimen sent was so broken in transit that it could not be figured.—ED.)

PUPINA GRANDIS, Forbes, var. MINOR.

Amongst a number of specimens recently obtained of this hitherto very rare shell is a small variety, so small, indeed, as to mislead in the identification of the species, if not pointed out.

Length 0·88; breadth 0·40 of an inch.

Hab. Louisiade Islands.

A second variety, of a large size, with a white peristome, is also worthy of note.

HELIX (GEOTROCHUS) XANTHOCHILA, Pfr. (Plate XLVIII. fig. 7.)

A variety of this fine species has been obtained in abundance where the reflexed lip is converted into a beautiful broad crenulated frill, and generally pure white. So much does it alter the character of the shell that it would lead to some difficulty in identifying the species. It is no accidental deformity, as the variety is almost as abundant as the original type.

Voluta (Callipara) brazieri, sp. nov. (Plate XLVIII. fig. 8.)

Shell oblong-ovate, thin; spire very slightly raised, acute; whorls smooth, striated longitudinally with lines of growth, and very finely closely striated throughout transversely with fine sculptured lines, apex granular; last whorl large and ventricose, shouldered towards the apex, and moderately contracted at the base; columella three-plaited, the plaits thin, close-set, prominent, and short; aperture ascending as high as the shoulder of the last whorl, narrow above, much wider below, owing to the receding columella; outer lip scarcely thickened, indistinctly banded about the centre with dark chestnut, ornamented with irregular buff-coloured markings.

Length 1·10; width 0·55 of an inch.

Hab. Wooli Wooli, Clarence River, east coast of New South Wales.

Voluta macgillivrayi, sp. nov. (Plate XLVIII. fig. 9.)

Shell ovate or oblong-ovate, thick, ponderous; spire short, conical, obtuse, obsoletely noduled at the apex; whorls smooth, bluntly angled above and nodosely tubercled at the angle, generally with nine large tubercles; cream-coloured, last whorl ornamented with three dark brown-red zones, composed of irregular-sized and irregularly distributed short dark brownish-red lines placed longitudinally, and minute round dots of the same colour, the interstices showing the cream-colour of the shell in irregular-sized pale spots, and displaying faint broad waved lines running longitudinally; columella strongly four-plaited; interior of the aperture and the columella pale orange carnelian; outer margin rather thin, rather widely expanded, and angulated opposite the row of tubercles.

Length 3·10; breadth 1·50 of an inch.

Hab. Woodlark Island (*mus. Cox*).

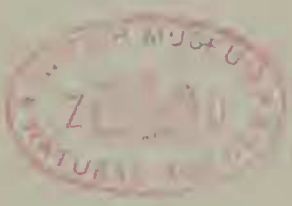
This fine species is allied to *V. innexa*, Reeve; but it is a much more ponderous shell, and is quite distinct in its markings, having none of those triangular ones characteristic of that species, and it is broader at the base. The peppered-like spots very much resemble those of *V. piperata*, Sow.; but it shows none of the olive-black waved streaks of that species, and, unlike *V. piperata*, it is bluntly shouldered with large nodular tubercles; the spire of *V. piperata* is also more attenuated and is smooth. They differ also materially in the shape and colour of the aperture.

Voluta innexa, Reeve.

Four very fine specimens of this rare species have been recently added to our Australian cabinets. Its true habitat has been ascertained without doubt to be the Louisiade group of islands, to the north-east of the Australian continent.

Cypræa coxeni, sp. nov. (Plate XLVIII. fig. 10.)

Shell subcylindrically ovate, attenuately beaked anteriorly; aper-



5/12

J.Smit lith.

M & N.Hanhart imp.

CHRYSOTIS BODINI.

ture narrow; teeth white, rather numerous and coarse, forming prominent ridges extending to the middle of the base; sides and base white; back profusely ornamented with irregular, rather large, generally elongated, dark chestnut markings.

Length 0·92; breadth 0·48 of an inch.

Hab. Solomon Islands.

This species was recently obtained from the above locality by Mr. Hargraves of this city. In general aspect it resembles some of the varieties of *Cypræa cribraria*, but differs from that species in having the teeth prominently produced a little more than halfway across the base, and in the dorsal ornamentation being in irregular elongated dark brown blotches.

DESCRIPTION OF PLATE XLVIII.

Fig. 1, 1 *a*. *Helix* (*Camæna*) *arthuriana*, p. 564.
2. —— (——) *rawnesleyi*, p. 564.
3. —— (——) *challisi*, p. 565.
4. —— (*Corasia*) *balcombei*, p. 565.
5, 5 *a*. —— *lcei*, p. 565.
6, 6 *a*. —— (*Geotrochus*) *redempta*, p. 566.
7. —— (——) *xanthochila*, var., p. 567.
8. *Voluta* (*Callipara*) *brazieri*, p. 568.
9. —— *macgillivrayi*, p. 568.
10. *Cypræa coxeni*, p. 568.

3. On a new American Parrot, of the Genus *Chrysotis*.

By O. Finsch, Ph.D., C.M.Z.S.

[Received May 21, 1873.]

(Plate XLIX.)

Chrysotis bodini, sp. nov. (Plate XLIX.)

Diagn. *Viridis; limbis plumarum nuchalium et cervicalium angustis nigrescentibus; fronte et sincipite rubris; loris nigris; plumis genarum mentique lilacino-limbatis; tergo uropygioque puniceis; rostro corneo-nigro.*

Description. Dark grass-green; underparts brighter, with a yellowish-green hue, especially on the vent and under tail-coverts. The feathers on the occiput, nape, and hind neck are tipped very narrowly with blackish, most visible on the latter, and more inconspicuous on the sides and fore part of neck. Front and sinciput bordered with yellowish at the base of the feathers. The feathers of the vertex tipped narrowly with obscure red, those on the cheeks and chin faintly with lilac-blue, giving those parts a bluish tint, more conspicuous in certain lights. From the nostrils to the eye a narrow black loral stripe. Hind back and rump vivid scarlet-red, with yellow base to the feathers. Primaries black, tipped with greenish blue; secondaries, tectrices of the primaries, and spurious wing green, like the back. Under wing-coverts and shoulders also green. Tail-feathers green from above and below, the two outer-

most tinged with red on the basal portion of the inner web, forming no distinct spot. Bill and cere blackish, at the base passing into hornish grey. Feet dark plumbeous; nails black; iris yellow, with an outer circle of red.

Whole length 14½, wing 7·5, tail 4·4 in.

Hab. America; certain locality unknown.

When visiting the magnificent Zoological Gardens at Berlin, the Secretary of the Society called my attention to this Parrot, which he could not find in my monograph, and which he considered to be new. A short time afterwards the specimen died, and by the kindness of Dr. Bodinus was forwarded to me. After a careful comparison, I have no doubt of the validity of this new species. *Chr. bodini*, which I take liberty to name after my friend Dr. Bodinus, the celebrated restorer and director of the Zoological Gardens at Berlin, comes, in respect of its red rump, nearest to *C. festiva*, L., from which species it differs greatly in having the front and sinciput red, in the lilac-blue edgings of the feathers on the cheeks and chin, in the dark tips on the nape and hind neck, and in the want of blue on the tectrices of the primaries and spurious wing.

The specimen described above proved upon dissection to be a female.

I beg leave to take this opportunity of stating that, in my opinion, *Conurus glaucifrons*, shortly described by Dr. Leybold ("Beschreibungen einiger Thiere und Pflanzen aus den Anden Chile's und der Argentinischen Provinzen," in 'Leopoldina' &c. Heft viii. No. 7, März 1873, p. 52), from the Argentine Republic, is nothing else than *Conurus acuticaudatus*, Vieill. (Finsch, Papag. i. p. 450), described already by Professor Burmeister as new, under the name *Conurus fugax* (Journ. f. Ornith. 1860, p. 243).

4. Description of a new Genus and Species of *Papilionidæ* from the South-eastern Himalayas. By W. S. Atkinson, M.A., F.L.S., &c.

[Received May 25, 1873.]

(Plate L.)

Bhutanitis, n. g.

Head of medium size, hairy. *Labial palpi* very hairy, long, slender, obliquely porrect, extending far beyond the eyes. *Antennæ* short, slender, with an elongated curved club.

Thorax rather slight. *Anterior wings* elongate elliptical; first subcostal nervule originating at nearly three fourths the length of the cell, the second about halfway between the origin of the first and the end of the cell, the third considerably beyond the cell, and the fourth somewhat nearer to the origin of the third; upper discocellular nervule very short, middle discocellular longer than the upper and lower together, basi-median nervule wanting. *Posterior*

G.H.Ford. Mintern Bros. imp.

BHUTANITIS LIDDERDALI.

wings elongate, the basal half very narrow, inner margin concave beyond the extremity of the abdomen, outer margin prominently convex, scalloped, and tailed. The precostal nervure branched, nearly as in *Eurycus*. *Legs* of moderate length; anterior tibiæ with a stout spine near the middle; tarsi slender, the first joint very long; claws simple, of unequal length.

Abdomen slender, extending to less than half the length of the posterior wings.

This genus is in some respects intermediate between the Mediterranean genus *Thais* and the Chinese *Sericinus*.

Bhutanitis lidderdalii, n. sp. (Plate L.)

Body and all the wings fuliginous black, with irregular white markings. Posterior wings three-tailed.

Anterior wings above with the cell crossed by four slender white bars at equal distances, and with a fifth similar bar beyond the extremity of the cell; the first and second bars continued in wavy scalloped lines to the interior margin, the third and fourth with white loops attached to their extremities below the nervure of the cell; a submarginal scalloped line from before the apex to the rounded posterior angle, within which are two somewhat suffused and deeply scalloped and irregular lines from the costal to the interior margin.

Posterior wings with the upper and outer portion marked with a network of white lines, the lower anal portion occupied by a large coloured patch, of which the upper part is bright crimson-red, and the lower rich orange, composed of three submarginal lunules, of which the interior is the largest and the exterior the smallest; the space between the red and orange occupied by a broad, transverse, deeply black belt, extending from the third median nervule to the anal angle, containing two large blind ocelli surmounted by white lunules, the first at the anal angle and the second between the first and second median nervules, together with a trace of a third ocellus between the second and third median nervules. The three median nervules extended into linear tails, of which the outermost is the longest ($\frac{7}{10}$ of an inch), and the innermost the shortest (about $\frac{3}{10}$ of an inch).

The underside of all the wings marked as above, but with the white lines broader, the orange lunules of a lighter colour, and the crimson-red replaced by light pink.

The abdomen barred and streaked longitudinally with yellowish-white lines; anal extremity yellow.

Expanse of wings $4\frac{1}{2}$ inches.

This fine insect was first discovered in May 1868, near Buxa, in the Bhutan Himalayas, at an elevation of 5000 feet, by Dr. R. Lidderdale, of the Bengal army. Dr. Lidderdale obtained two fresh specimens from the same locality in 1872; and from one of these, kindly communicated to me, the foregoing description and the accompanying drawing have been prepared.

I am glad to associate Dr. Lidderdale's name with his very in-

teresting discovery, which adds a new and remarkable form to the family of the Papilionidæ.

Other specimens have since been taken at Buxa by Lieut. H. M. Rose, of the Bengal Staff Corps.

5. On Chinese Deer, with the Description of an apparently new Species. By Robert Swinhoe, F.Z.S., H.B.M. Consul at Chefoo.

[Received June 4, 1873.]

During my two months' residence in Shanghai I have been paying particular attention to Deer; and I now hasten to communicate to you my notes, to be read before the Society, while they are still fresh in my mind and not obliterated by the confusion of packing and moving to my next post at Chefoo, the north-eastern point of the province of Shantung. *Hydropotes inermis* has been extremely abundant this winter, ranging within a few scores of miles of Shanghai; and shooting-parties have brought back as many as thirty at a time. The market, the whole season through, has been perfectly glutted with them; and numbers rot for want of consumers. Four and sixpence each was the price they fell to. They hide in marshy ground, and are usually started singly; but a gentleman here tells me that he put up a herd of twenty on one occasion, in the great marsh beyond the Hangchow-Bay sea-wall, near Fung Hien city, the ground whence the Shanghai market gets most of its supply of wild game. Another sporting friend confirmed the numerous progeny at a birth, and said that twice this winter he had found seven young ones in females that had been opened. I had some females opened in the market; but they were childless. An embryo procured at Chinkiang was placed in spirits and given to me; and I have lately forwarded it to the Museum of the Royal College of Surgeons. In the adult male carcasses that I have examined I have always found the canines loose, moving readily backwards and forwards and from side to side. The undeveloped canines were, on the contrary, firmly fixed; they had also the appearance of having been whetted to an edge on their inner line. I never had the opportunity of watching a live adult male, but, from the fact of these teeth being loose, imagine it possible that the animal might have muscular power over them. This I communicated to Prof. Busk, enclosing the fully developed tusks of a specimen known to have been three years old when it died. Prof. Busk scouted the idea of muscularity; and I determined to have the point settled here. To this end I asked the assistance of two of the leading surgeons at Shanghai. I sent a fresh adult skull to Dr. L. H. Little, and took two to the study of Dr. R. A. Jamieson, who had kindly agreed to dissect and examine them in my company. He cut open the socket and took out the tooth. The tissue round the

fang was submitted to the microscope; and no muscular fibre could be detected. The gum round the tooth was then examined, but with similar result; the gum was no other than ordinary. The movement of the tooth moves the surrounding gum, which firmly clasps it; but neither the gums nor the lips have any power to move the teeth. The angle subtended by the movement backward and forward of each tooth we guessed to be between 10° and 15°. Dr. Little had not had time to examine his specimen, but suggested that the action in the tooth might be guided by erectile tissue, which would be more developed at the rutting-season, and give a firmer hold to the tooth when required for fighting-purposes. I conferred with Dr. Jamieson on this suggestion; and he writes, "I am quite sure that in the section we placed under the microscope the other day we saw nothing answering to the dense network of capillaries, and to the plexus of epithelium-lined trabeculæ divided by muscular fasciculi, which go to make up an erectile tissue? When is the rutting-time? If the movable tusks are secondary sexual characteristics, we ought then to find the vessels in a more developed state, and more favourable for examination." But these Deer are only procurable in winter, and the rutting-time is not then; so the question cannot just now be satisfactorily settled. The tooth pushes forward in its growth, and the cavity left behind the fang closes after it, as will be seen in the woodcuts given in Sir Victor Brooke's paper on *Hydropotes* (P. Z. S. 1872, p. 522), until the end of the third year, when the animal is full-grown and the tooth fully developed; it is then, and only then, found to show the loose character above referred to. I was pleased to find an adult male in an aviary belonging to a gentleman here. He had had the animal many years, and refused to sell it. This creature I found, to my surprise, carried its tusks lying back against the long tuft of hair on each side of its under jaw. Mr. Vrard declared that the tusks had always been in that position, and that he had never seen the animal move them. In death they certainly are always vertical; and I suspect this animal must have had an accident which forced them into their present position. It seemed very tame, and allowed the birds to perch on its back without being disturbed. I watched in vain to see it move its tusks; and it was not easy to get hold of it for the purpose of handling them. The *Hydropotes*, I note, has no glandular patch on the tarsus. A specimen of its skull (adult male) that I possess has an extra first premolar on each side of the upper jaw; that on the right side is situated inwards alongside of the normal tooth; that on the left is wedged angularly between the first and second premolars.

I will now pass on to describe a very fine new species of Deer which I have lately acquired from the neighbouring country, and which in size will vie with most of the known species.

The antlered Deer of the mountains south of the Yangtse.

In writing on Deer from Ningpo (see P. Z. S. 1872, p. 815) I mentioned to you that a Chinese hunter from the Fychow

(Hwnychow) mountains, who had brought me a fine Tiger's skull, had also the budding velvet of an apparently small-antlered Deer—also that Père Heude had told me that men from the Fokien province came yearly to the mountains that formed the border between Ganhwuy and Chekiang to hunt Stags for their velvet, which is greatly valued for its medical properties, and that English sportsmen at Chinkiang had reported having occasionally seen Deer with antlers, though none had ever been procured. With this information on my mind, I did not cease to make inquiries, and was greatly delighted to learn from my correspondent, Mr. H. Kopsch, the Customs Commissioner at Kiukiang, up the Yangtse river, that now and then dead antlered Deer were brought into the market of that place for sale during the winter. I begged Mr. Kopsch to be on the look-out this winter, as, being at Shanghai myself, a fresh specimen despatched from Kiukiang would reach me fresh, and enable me to examine and describe it; and I promised Mr. Kopsch that, if new, I would dedicate it to him. On the 27th of February I received the animal which I will proceed to describe, with the following note:—"The vendor of the Deer told me it came from the department of Kienchang, on the eastern side of this province (Kiangse), bordering on Fokien. They have antlers; but the one I send has either dropped his or they have not come yet. The man said they are hard to get; men from Fokien hunt them for their horns." The venison was large and fine, and greatly superior to the flesh of *Hydropotes*, the ordinary venison of Shanghai.

Cervus kopschi, sp. nov.

This noble beast measured 4 feet 4 inches from its muzzle to the root of its tail, and stood about 2 feet 10 inches high at the shoulders. Its horns were only in bud; but their pedicles, about 2 inches long and slender, showed that the animal was only in its second year. I doubt whether the horns would ever be very robust; but the mature animal would no doubt attain a larger size. Head small, with very small eye and long ears; neck narrow and long; legs long and thick. Hair on neck rather coarse, on abdomen long and curly. The glandular tarsal spot about $1\frac{3}{4}$ inch in diameter, of a circular form, grizzled black and white, with a bordering circle of buff colour, and situated about 5 inches below the hock. Eyelashes short and black; long black bristles from above the eyes, and shorter ones from below; black spots on the sides of the snout, each giving rise to a bristle; bristles also on the chin. A dorsal line runs down the back, starting from between the ears, chestnut-coloured down the hind neck, becomes deep umber-brown between the shoulders, pales along the back, and deepens again on the rump. The upper surface of the tail is black, the colour extending on each side on to the long hairs at the edge of the rump, so as to form a T mark. Upper parts of the body brown, mottled with light yellowish brown; a row of indistinct white spots along each border of the dorsal line. Humerus, sides of belly, and thighs light purplish brown to knee- and hock-joints, grizzled with yellowish as far as feet, where clear

tawny; hocks chestnut tawny, as also the outer side of tarsus below the glandular patch. Hoofs black, light brown colour at tips. Belly and inside of fore legs brownish white, a deep-brown line running down centre of breast. Between thighs and under tail pure white. Head, neck, back, and outer edges of ears brown, whitish near edge of under lip and on throat; a deep-brown spot on chin; inside of ears pure white, their backs whitish at outer base.

Measurements.

	ft.	in.
Thigh-joint to tip of toe	2	9
Shoulder-joint to tip of toe	2	6½
Elbow-joint to knee-joint	0	10
Knee-joint to carpal joint	0	7½
Carpal joint to hoof	0	3½
Hoof of fore foot	0	1·7
Hip to hock-joint	1	3½
Hock-joint to tarsal joint	0	11
Tarsal joint to hoof	0	3½
Hoof of hind foot	0	1¾
Tail to tips of hair	0	8½
Head, length of	0	10½
„ depth of, at gape	0	3¼
„ depth of, before eye	0	4¾
„ depth of, at horns	0	5¾
Ear, length of	0	7
„ breadth of	0	2¾
Eye to tip of nose	0	5¼
Between ears	0	3¾
Between horns	0	2·4
Length of eye	0	1¼
Between eyes (fore canthus)	0	2½
Between eyes (hind canthus)	0	3¾
Length of lachrymal slit	0	0½
Neck	0	11
Upper lip	0	3¼
Under lip	0	2½
Breadth of nose	0	1½
Depth of nose	0	1
Split of toes of fore foot	0	3¾
Split of toes of hind foot	0	3¾

The skull of this creature is now before me. It seems to me to resemble the skull of *Hydropotes* more than that of any other species I am acquainted with. It has the same Rusine characters of the base of the cranium pointed out by Sir Victor Brooke, and has also a similar small lachrymal sinus or *crumen* contained within the lachrymal bone itself. The cartilaginous space, however, at the meeting of the frontal, maxillary, nasal, and lachrymal bones is very large; and the backward end of the supraorbital foramen extends beyond the postorbital line.

The canines are small and spurious. The nasals are open in rear, admitting the frontals between in wedge form; and the pointed sutures are zigzag and mazy, showing that they have the weight and strain of horns to bear. The horn-pedicles are very slender, more so even than in *Cervulus*; and the frontal is only thickened behind the orbit. Incisors: the two central large and flat, the next on each side as broad as the two lateral taken together. Molars, in young state, four on each side above and below, the hindmost one just beginning to show.

Mr. Kopsch has tried hard to get the borns of this species; but the season has passed and he has not succeeded; and no other specimen has come to market. I should judge, from the appearance of the specimen in hand, that the horns will be very slender, and probably of some strange form, which, taken with the cranial peculiarities of the beast, will entitle it to subgeneric separation. However, we must get the horns before we can venture on that. It may turn out to be a Rusine Roebuck.

6. Note on the Genus *Ornithion* of Hartlaub. By P. L. Sclater, M.A., Ph.D., F.R.S., &c.

In 1853 Dr. Hartlaub established the genus *Ornithion*, belonging to the Tyrannidæ, and described a single species (*O. inerme*) from a specimen in the Bremen collection. Although I have long well known this little bird from the typical example, kindly sent to me for examination by the describer, it is only recently, in spite of the enormous number of American bird-skins that have passed through my hands, that I have succeeded in obtaining a skin of it for my own collection. The acquisition of this second specimen has caused me to examine the form more closely; and I have come to the conclusion that *Ornithion* cannot be well kept apart from the bird named by Cabanis *Myiopatis pusilla*, which is again identical with *Camptostoma flaviventre*, Scl. et Salv. I have also resolved that the two other species of *Myiopatis* of Cab. and Heine may be naturally located in the same genus, which is remarkable amongst the Tyrannidæ for its small short compressed bill, without any trace of rictal bristles. If this course be adopted the synonymy of the genus will stand as follows:—

Genus Ornithion.

	Type.
1853. *Ornithion*, Hartl. J. f. O. 1853, p. 35	*O. inerme*, Hartl.
1857. *Camptostoma*, Scl. P. Z. S. 1857, p. 203	*C. imberbe*, Scl.
1859. *Myiopatis*, Cab. et Hein. Mus. Hein. ii. p. 58	*Muscipeta incanescens*, Max.

Diagnoses specierum.

a. ventre flavo: tectricibus alarum albo (aut flavido) distincte terminatis.

- loris distincte albis: cauda breviore ..... 1. *inerme.*
- loris obscuris: cauda longiore ..... 2. *pusillum.*

b. ventre grisescenti-albido: tectricibus alarum ochraceo marginatis.
{ minor : interscapulio cineraceo ..... 3. *incanescens.*
{ major: interscapulio olivaceo perfuso ..... 4. *obsoletum.*

1. ORNITHION INERME.

Ornithion inerme, Hartl. J. f. Orn. 1853, p. 35 ; Cab. et Heine, Mus. Hein. ii. p. 57.

Supra olivaceum, pileo cineraceo perfuso : loris distincte albis : alis caudaque fuscescenti-nigris, illarum tectricibus flavicanti-albo distincte terminatis : subtus pallide flavum, gutture albescentiore : long. tota 2·2, *alæ* 1·8, *caudæ* 1·1.

Hab. Guiana.

Mus. Bremensi, Berolinensi et P. L. S.

Obs. Species valde affinis sequenti, sed rostro longiore, cauda breviore et loris distincte albis forsan diversa.

2. ORNITHION PUSILLUM.

Myiopatis pusilla, Cab. et Hein. Mus. Hein. ii. p. 58 (1859).

Camptostoma flaviventre, Scl. et Salv. P. Z. S. 1864, p. 358, et P. Z. S. 1867, p. 577.

Camptostoma imberbe, Taylor, Ibis, 1864, p. 86.

Supra olivaceum, pileo obscuriore, loris pallidioribus : alis caudaque fuscescenti-nigris, illarum tectricibus flavicanti-albo terminatis : subtus pallide flavum, gutture albicantiore : long. tota 2·2, *alæ* 1·9, *caudæ* 1·4.

Hab. Chiriqui (*Arcé*); Panama (*McClean*) ; Western Ecuador (*Fraser*) ; Cartagena (*Mus. Berol.*) ; Trinidad (*Taylor*) ; Guiana (*Mus. P. L. S.*) ; Mexiana (*Wallace*) ; Eastern Peru (*E. B.*).

After comparing skins from all these localities in my own and Mr. Salvin's collections, and reference to the typical specimens of *Myiopatis pusilla*, I have come to the conclusion that they must all be referred to one species. In fresh-moulted birds the wing-marks are more distinct and the belly much brighter. As the plumage grows older the wing-marks tend to wear off, and the yellow fades.

3. ORNITHION INCANESCENS.

Muscipeta incanescens, Max. Beitr. iii. p. 898.

Myiopatis incanescens, Cab. et Hein. Mus. Hein. ii. p. 58 ; Pelz. Orn. Bras. p. 106 (ex Brasil.).

Camptostoma imberbe, Scl. P. Z. S. 1857, p. 203 ; et Ibis, 1859, p. 444, pl. 14. fig. 1 ; et Cat. A. B. p. 215 (ex Mexico).

Eupsilostoma pusillum, Scl. P. Z. S. 1860, pp. 68, 283, et Cat. A. B. p. 215 (ex Æquator. occ.).

Supra cineraceo-olivaceum : uropygio dilutiore, loris albidis : alis caudaque obscuris, alarum tectricibus ochraceo terminatis : subtus grisescenti-albidum, olivaceo vix tinctum ; campterio et subalaribus ochraceis : long. tota 3·7, *alæ* 1·9, *caudæ* 1·6.

Hab. Mexico (*Sallé*) ; Guatemala et Nicaragua (*Salvin*) ; Western Ecuador (*Fraser*) ; S.E. Brazil, San Paulo and Goyaz (*Natt.*) ; Bahia (*Max.*).

Obs. Species a præcedentibus ventre grisescente et fasciis alarum ochraceis distinguenda.

After a critical examination of many specimens of this bird, I have come to the conclusion that there is only one species of wide distribution. The original Mexican skin of *Camptostoma imberbe* is much worn and faded and has an injured bill. But Mr. Salvin's Central-American skins can hardly be distinguished from Brazilian skins except by their rather smaller size. The specimens from Western Ecuador have a paler rump; but this is perhaps attributable to immaturity.

4. Ornithion obsoletum.

Muscicapa obsoleta, Temm. Pl. Col. 275. fig. 1; Lafr. et D'Orb. Syn. Av. i. p. 52.

Elainea obsoleta, Burm. Syst. Ueb. ii. p. 480.

Myiopatis obsoleta, Cab. et Hein. Mus. Hein. ii. p. 58; Pelz. Orn. Bras. p. 106.

Simile præcedenti, sed major, et supra, nisi in pileo, olivaceo perfusum: long. tota 4, *alæ* 2·2, *caudæ* 1·8.

Hab. S. Brazil; San Paulo, Parana and Goyaz (*Natt.*).

7. On the *Cuculidæ* of the Ethiopian Region. By R. Bowdler Sharpe, F.L.S., F.Z.S., Senior Assistant, Zoological Department, British Museum.

[Received June 3, 1873.]

Africa is especially rich in scansorial birds. Besides monopolizing the *Musophagidæ*, she constitutes the metropolis of the *Indicatoridæ*, and has likewise a large number of the *Capitonidæ* peculiar to herself. But her *Cuculidæ* are not exclusively her own; for Europe, Asia, and Australia claim some representatives of the same genera: indeed all the forms of Cuculine birds found in Africa are represented by the same or by closely allied genera in other parts of the Old World; and in the case of the *Cuculidæ* Africa exhibits no Neogæan affinities.

Setting aside the typical genus *Cuculus*, which is found over the greater part of the Old World, the affinities of the African Cuckoos unquestionably incline to those of the Indian and Australian regions, through the genus *Centropus*, being more particularly connected with the former in the genera *Coccystes* and *Ceuthmochares*. The Mascarene Islands exhibit decidedly Indian affinities; for a *Cuculus* occurs within their limits which is almost indistinguishable from a Himalayan species, and is considered by more than one naturalist of position to be absolutely inseparable from its Indian ally. *Cochlothraustes* is also a Centropodine genus; but at the same time the large and important genus *Sericosomus* is entirely restricted to the Mascarene subregion.

For present purposes it will be sufficient to make two divisions of

the African *Cuculidæ*, which seem to me to rest on natural characters, and I therefore divide them into two subfamilies, viz. *Cuculinæ* and *Phœnicophaïnæ**. The former have feathered legs and weak feet, but excel in their powerful flight, while the latter are creeping bush-haunting birds, many of them frequenting the ground. They may be divided by the following characters :—

a. Tarsi feathered anteriorly; thigh-feathers long, hiding the tarsus, as in the birds of prey; nostrils swollen ..... *Cuculinæ*.
b. Tarsi robust and naked, or only feathered on the upper part; thigh-feathers ordinary; nostrils not swollen..... *Phœnicophaïnæ*.

All the birds included by me in the first subfamily have accipitrine thigh-feathers, and present another point of importance in the swollen nostril, which is sufficiently distinct in the dried skin. I cannot find any character in the genus *Chrysococcyx* to justify its separation from *Cuculus*, beyond the metallic plumage : this, however, does not seem to me to be of sufficient importance ; for even on species of true *Cuculus* a slightly glossy shade is visible, and the glittering dress of the African species is approached by gradual gradations exhibited in the Australian members, which have usually been called *Lamprococcyx*.

The *Cuculinæ* have the nasal opening surrounded by a swollen membrane, rounded in *Cuculus*, a little more oval in *Coccystes*. These differences are, I think, well pronounced ; though it is much to be regretted that collectors are so careless about the preservation of the nostrils of their specimens, thus rendering obsolete a very important element in the classification of birds. In addition to the shape of the nostril, the lanceolate crest of *Coccystes* is a further distinguishing character.

Subfam. 1. Cuculinæ.

Key to the genera.

a. Nostrils swollen, rounded ; no crest ..... 1. *Cuculus*.
b. Nostrils oval ; a distinct lanceolate occipital crest ..... 2. *Coccystes*.

Genus 1. Cuculus.

Key to the species.

A. Plumage not conspicuously metallic.
a. Breast white, barred with black.
a'. Upper mandible black, as also the nostrils ; lower mandible yellow.
a''. Throat and upper breast ashy grey.
a'''. Much larger ; above ashy grey, as also the wings ..... 1. *canorus*.
b'''. Smaller ; above blackish grey, the wings uniform with back.. ..... 2. *rochi*.
b''. Upper breast ferruginous.
c'''. Throat ashy grey ..... 3. *solitarius*.
d'''. Throat bright ferruginous, as also the whole of the upper breast..... 4. *gabonensis*.

* With respect to the Old-World Cuckoos, I see no reason to separate the *Centropodinæ* from the *Phœnicophaïnæ*, and I therefore adopt the latter term on the score of priority.

b'. Bill black only towards the tip, both the upper and under mandibles yellow, as also the nostrils.
a''. Larger, the throat entirely ashy grey; the breast bright rufous; under wing-coverts washed with rufous ..... 5. *aurantiirostris*.
b''. Smaller; the throat entirely ashy grey, the upper breast slightly tinged with rufous; under wing-coverts white ..... 6. *gularis*.
b. Breast black ..... 7. *clamosus*.
B. Plumage beautifully metallic.
a. Abdomen bright yellow ..... 8. *smaragdineus*.
b. Abdomen white; flanks banded.
a''. Larger; tail metallic greenish blue, spotted with white ..... 9. *cupreus*.
b''. Smaller; tail white, spotted with coppery green 10. *klaasi*.

Fig. 1.

Head and leg of *Cuculus canorus*.

1. Cuculus canorus*.

Cuculus canorus, Linn. Syst. Nat. i. p. 168 (1766); Rüpp. Syst.

* The plate 390 of the 'Planches Enluminées,' hitherto considered to represent *Cuculus solitarius*, on which it has imposed the priority of its name, seems

Uebers. p. 96 (1845); Heugl. Syst. Uebers. p. 48 (1856); Hartl. Orn. Westafr. p. 266 (1857); Heugl. Peterm. Mitth. 1861, p. 26; Bocage, Jorn. Lisb. ii. p. 45 (1868); Finsch, Tr. Zool. Soc. vii. p. 286 (1870); Blanf. Geol. and Zool. Abyss. p. 312 (1870); Sharpe, Cat. Afr. B. p. 12 (1871); Gurney, Ibis, 1871, p. 103; Heugl. Orn. N. O. Afr. p. 780 (1872); Shelley, B. of Egypt, p. 162 (1872); Sharpe, Ibis, 1872, p. 67; Anderss. B. Damara Land, ed. Gurney, p. 227 (1872).

Coucou vulgaire d'Europe, Levaill. Ois. d'Afr. v. pl. 202, 203 (1806); Sundev. Crit. om Levaill. p. 47 (1858).

Cuculus gularis, Gurney, Ibis, 1859, p. 246.

Coucou du Cap de Bonne Espérance, Buff. Pl. Enl. vi. pl. 390, et Hist. Nat. Ois. vi. p. 353.

Cuculus capensis, Müll. Syst. Nat. Suppl. p. 90 (1776); Gm. S. N. i. p. 410 (1788); Lath. Ind. Orn. i. p. 208 (1790); Steph. Gen. Zool. ix. pt. i. p. 85 (1815); Cass. Proc. Phil. Acad. 1864, p. 243.

Cape-Cuckow, Lath. Gen. Syn. i. pt. 2, p. 513 (1782).

Adult male. Above ashy grey, much darker on the back, where it is glossed slightly with greenish; the head, rump, and upper tail-coverts much paler grey; wing-coverts dark grey, with scarcely any greenish gloss; quills brownish, the secondaries slightly glossed with greenish in some lights, the inner web broadly and numerously barred with white, these white bars, however, not occupying more than two thirds of the quill; tail blackish, tipped with white, the centre feathers showing an indication of a tiny white spot along the shaft, a little plainer on the three outer ones, becoming larger towards the outermost, the four external feathers also minutely spotted with white on the inner web, these also increasing in size towards the outer feather, at the base of which they form irregular bars; sides of the face, entire throat, and fore neck pale blue-grey; rest of the under surface of the body white, transversely barred with rather narrow lines of greyish black; vent and under tail-coverts whiter, indistinctly barred with blackish, the bars on the longer tail-coverts broader, but further apart; under wing-coverts white, shading into greyish on the edge of the wing and lower coverts; bill horn-black, with a little yellow at the gape and on the base of the lower mandible; feet yellow, nails brownish; iris and eyelid yellow. Total length 13 inches, culmen 1·15, wing 8·8, tail 7·5, tarsus 0·9.

Hab. N.E. Africa: Egypt (*G. E. Shelley*); Bogos Land (*Blanford, Jesse, Esler*); Lower Nubia, in March (*Hartmann*); New Dongola, in September; Old Dongola, in April; N. Senaar, in May (*von Heuglin*). W. Africa: Fantee (*Swanzy, Mus. Brit.*); Connor's Hill, Cape Coast, November 2nd, 1870 (*Ussher*); St. Thomas (*Weiss*). S.W. Africa: Otjimbinque, Damara Land,

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to me to be referable to the hepatic phase of *C. canorus*, of which I have a Damara specimen in the same plumage; and Levaillant's suggestion that it is a young *C. solitarius* will not stand the comparison of specimens. I therefore add its synonymy to *C. canorus*.

February 1865 (*Andersson*); Ondonga, Ovampo, December 1866 (*Andersson*); Biballa (*Anchieta*). S. Africa: Natal (*Ayres*).

2. Cuculus rochi.

Cuculus canorus, Desjard. P. Z. S. 1832, p. 111.

Cuculus rochii, Hartl. P. Z. S. 1862, p. 224 (descr. orig.); Roch & Newt. Ibis, 1863, p. 166; E. Newt. Ibis, 1863, p. 453; Schl. P. Z. S. 1866, p. 424; Schl. & Poll. Faun. Madag. Ois. p. 53 (1868); Gray, Hand-l. B. ii. p. 215 (1870); Sharpe, P. Z. S. 1870, p. 399; id. Cat. Afr. B. p. 12 (1871).

Cuculus himalayanus, Grand. Rev. et Mag. de Zool. 1867, p. 418.

Adult. Above dark cindery grey, the lores a little tinged with brownish, the middle of the back and scapulars glossed in certain lights with dull greenish; lower back and rump more decidedly ashy, the shafts of all the feathers glossy black, and the feathers themselves obsoletely waved in certain lights; wing-coverts coloured like the back, and glossed with dull greenish in the same manner, excepting the spurious wing, the feathers of which are externally white, thus showing a little white patch on the upper edge of the wing; quills glossy brown, externally shaded with greenish, the inner web broadly barred with white; tail glossy black, tipped with white, the two centre feathers marked with a series of equidistant narrow longitudinal white spots along the shaft, the other feathers similarly marked, but the spots rather larger and rounder on the outer feathers, on the inner webs of which appear likewise some irregular white spots, increasing in size and extent towards the outermost feathers, taking at the base of the latter the form of irregular bars, shafts blackish above, white below; cheeks and throat bluish grey, lighter than the head; rest of under surface creamy white, transversely barred with greyish black; vent and under tail-coverts deep ochraceous buff, the long coverts broadly barred with blackish, the shorter ones less distinctly; under wing-coverts creamy white, with narrow blackish cross bars; edge of the wing greyish; bill black, yellow at base of lower mandible; gape, orbits, and feet yellow, claws blackish; iris orange yellow. Total length 12 inches, culmen 0·95, wing 6·7, tail 6·0, tarsus 0·7.

Hab. Madagascar (*Roch* and *Newton*, *Crossley*); ? Mauritius, Port Louis (*E. Newton*).

Although closely allied to *C. poliocephalus* (Hand-l. 8990. *C. himalayensis*), this Cuckoo seems to me to be a distinct species. It is much darker above, and is not so broadly banded underneath, the white interspaces being wider.

3. Cuculus solitarius.

Le Coucou solitaire, Levaill. Ois. d'Afr. v. pl. 206 (1806); Sundev. Crit. om Levaill. p. 47 (1858).

Cuculus solitarius, Steph. Gen. Zool. ix. pt. 1, p. 84, pl. 18 (1815); Gurney, Ibis, 1860, p. 213; Layard, B. S. Afr. p. 248 (1867).

Cuculus rubiculus, Swains. B. W. Afr. ii. p. 181 (1837, *descr. orig.*); Fraser, P. Z. S. 1843, p. 52; Hartl. Orn. W. Afr. p. 190 (1857); id. J. f. O. 1861, p. 264; Cab. & Heine, Mus. Hein. iv. p. 40 (1862); Mont. P. Z. S. 1865, p. 92; Sharpe, Ibis, 1870, p. 486; id. Cat. Afr. B. p. 12 (1871).

Cuculus capensis, Gray, Gen. B. ii. p. 463 (1847); Grill, Zool. Ant. p. 41 (1858); Cab. & Heine, Mus. Hein. Th. iv. p. 42 (1862); Bp. Consp. i. p. 104 (1850); Schl. Mus. P. B. *Cuculi*, p. 11 (1864); Antin. Cat. descr. Ucc. p. 83 (1865); Gray, Hand-l. B. ii. p. 215 (1870); Heugl. Orn. N. O. Afr. p. 783 (1871); Sharpe, Cat. Afr. B. p. 12 (1871).

Surniculus rubiculus, Bp. Consp. i. p. 105 (1850).

Cuculus heuglinii, Cab. & Heine, Mus. Hein. Th. iv. p. 42 (1862).

Adult. Above greyish, with a slight gloss of oily green on the scapulars and secondary feathers, the rump and upper tail-coverts darker and inclining to cindery grey; quills brown, barred with white near the base of the inner web; tail purplish black, glossed with greenish near the base, tipped with white and marked with one or two white spots along the shafts of the feathers, the inner web also slightly marked with white on its edge; throat clear bluish-grey; fore neck deep ferruginous, with slight indications of blackish cross bars; rest of under surface fulvous white, banded with blackish, inclining to clear fawn on the under tail-coverts, where the cross bars are narrower and more zig-zag in shape; bill horn-black, yellowish at base of lower mandible and along basal edge of upper one; feet deep orange, claws yellowish; iris reddish hazel.

Young. Above ashy brown, the wing-coverts and secondaries edged and the primaries externally barred with rusty; upper tail-coverts spotted and irregularly barred with rusty; tail blackish brown, tipped and spotted with whitish on each side of the shaft, the feathers also showing faint indications of rufous cross bars; lores and cheeks whitish, mottled with blackish and tinged with rufous; throat and chest whitish, strongly washed with rusty and minutely crossed with very narrow blackish bars; rest of under surface buffy white with cross bars of black, inclining to clear fawn on the under tail-coverts, where the black bars are narrower; under wing-coverts white, with blackish cross markings, the bases of the primaries white, some of the feathers also notched with white near the base; bill horn-black, greenish yellow on lower mandible; feet dull yellowish.

Hab. W. Africa: Fantee (*Ussher*); Accra (*Haynes*). S.W. Africa: Benguela (*Monteiro*). S. Africa: Natal (*Ayres*); Knysna (*Victorin*); Cape Colony up to immediate vicinity of Cape Town (*Layard*)*.

I have come to the conclusion that there is no difference between *Cuculus rubeculus* and *C. capensis*, though I once (Ibis, 1870, p. 486)

* Its occurrence in Senegal, on Swainson's authority, is untrustworthy; and it is doubtful if it is found in N.E. Africa, though, as Heuglin remarks, "Antinori seems to have observed it on the Gazelle River" (*Cf.* Salvadori, Atti R. Accad. Tor. 1870, p. 744).

thought that the longer wing of the latter might hold good as a specific character. That it does not do so will be seen by the following measurements:—

No.	Locality.	E Mus.	Long. tot.	Alæ.
1.	Cape.	Brit. Reg.	11·5	7·0
2.	S. Africa.	,,	11·5	7·2
3.	,,	R. B. Sharpe.	12·0	6·8
4.	,, (*Layard*).	,,	11·5	6·8
5.	,,	,,	12·0	6·8
6.	Cape Town (*Butler*).	,,	12·0	7·1
7.	,,	,,	12·1	7·0
8.	Natal (*Ayres*).	J. H. Gurney.	11·2	6·9
9.	...	Brit. Reg.	10·5	6·5
10.	Accra (*Haynes*).	R. B. Sharpe.	11·5	6·4
11.	Fantee.	,,	11·7	7·0
12.	,,	,,	11·2	6·4

4. Cuculus gabonensis.

Cuculus gabonensis, Lafr. Rev. et Mag. de Zool. 1853, p. 60; Hartl. J. f. O. 1854, p. 202; J. & E. Verr. Rev. et Mag. de Zool. 1855, p. 177; Hartl. Orn. W. Afr. p. 189 (1857); Cass. Pr. Phil. Acad. 1859, p. 142; Hartl. J. f. O. 1861, p. 265; Du Chaillu, Eq. Afr. p. 473 (1861); Cab. & Heine, Mus. Hein. Th. iv. p. 42, note (1862); Gray, Hand-l. B. ii. p. 215 (1870).

Adult. Above dark greyish black, with a very slight gloss of dull bluish-green; quills brown, glossed like the back, a few of the primaries marked with white near the base of the inner web; tail blackish, tipped with white and marked with a few spots of white along the shaft; lores mottled with rufous; fore part of the cheeks and a line of feathers under the eye greenish black, like the head; entire throat, chest, and fore neck deep cinnamon-chestnut or bay, forming a conspicuous gorget, below which a few black feathers form an indistinct band; rest of under surface buffy white, transversely crossed with blackish bars, which are slightly glossed with greenish on the flanks; under tail-coverts creamy white, some of the centre ones barred with black; feathers at the side of the vent greenish black; under wing-coverts white, barred with black like the breast, the greater ones entirely black; bill blackish brown; feet golden yellow, claws horn-brown. Total length 11·5 inches, culmen 0·9, wing 6·8, tail 6·2, tarsus 0·75.

Hab. Gaboon (*Verreaux, Mus. Brit.*); Camma River (*Du Chaillu*).

5. Cuculus aurantiirostris, sp. n.

Cuculus gularis, Hartl. Orn. W. Afr. p. 189 (1857).

Above rather dark grey, with a slight greenish gloss in the centre of the back, the rump and upper tail-coverts scarcely lighter, the latter with a narrow white tip; wing-coverts of the same colour as

the back, some of the greater ones slightly inclining to brownish, with a narrow white margin; a conspicuous patch of white feathers along the edge of the wing; quills brownish, washed externally with grey, the secondaries much darker on the inner web, where they are slightly glossed with greenish and narrowly margined with white; the inner webs of all the feathers white at the base, this colour extending uninterruptedly for nearly half the feather, and broken towards its apical extent by a few more or less interrupted bars of greyish brown; tail greyish brown, with a decided wash of clearer grey on the outer web, all the feathers tipped with white, the outer ones very broadly, with a distinct blackish bar crossing the tail just before the white tip, the centre feathers longitudinally spotted with white along the shaft, these spots increasing in size towards the outer feathers, which are also notched with white on the inner web, till on the outermost they form very distinct white bars across the feathers; sides of the face of the same colour as the head; lores, feathers in front of the eye, fore part of cheeks, and entire throat pale bluish grey; lower part of throat and fore neck bright chestnut; rest of under surface buff, strongly shaded with chestnut and crossed with very narrow blackish lines; under tail-coverts uniform rich buff; under wing-coverts buff, with very narrow blackish vermiculations; bill rich orange, blackish along the culmen and towards the tip of both mandibles; feet deep yellow. Total length 13·4 inches, culmen 1·05, wing 8·7, tail 7·0, tarsus 0·95.

Hab. River Gambia (*Mus. R. B. S.*); Casamanze (*Verreaux*).

To the same extent that *Cuculus gularis* differs from *C. canorus* does this new bird differ from *C. gularis*. It might be supposed that a new Cuckoo of this group, coming as it does from Senegambia, must be the true *C. lineatus* of Swainson; but neither his description nor figure agrees at all; and there can be no doubt that, as in the case of *Oriolus capensis* and other birds, he has figured a South-African specimen, and that the species has no business in the list of West-African birds. Like *C. gularis*, the Gambian Cuckoo has the nostrils situated in, and of the same colour as, the yellow portion of the beak; but this is much more brilliantly coloured; hence the name suggested. The chestnut shade on the under parts is another character; while the cross bars on the under surface are very much narrower than in true *C. gularis*.

It is just possible that *C. aurantiirostris* may turn out to be the *C. ruficollis* of Heuglin, or *C. leptodetus* of Cabanis and Heine, from North-eastern Africa; and a comparison of types is desirable. The two latter are united without a query to *C. gularis* by von Heuglin. On the other hand, the bird noticed by Hartlaub from Casamanze is clearly *C. aurantiirostris*, so that it is by no means improbable that Senegambia has its peculiar species of Cuckoo.

6. Cuculus gularis.

Le Coucou vulgaire d'Afrique, Levaill. Ois. d'Afr. v. pls. 200, 201 (1806); Sundev. Crit. om Levaill. p. 47 (1858).

Cuculus gularis, Steph. Gen. Zool. ix. pt. 1, p. 83, pl. 17 (1815,

ex Levaill.); Bp. Consp. i. p. 102 (1850); id. Consp. Volucr. Zyg. p. 6 (1854); Cab. & Heine, Mus. Hein. iv. p. 36 (1862); Heugl. J. f. O. 1862, p. 35; Layard, B. S. Afr. p. 249 (1867); Gray, Hand-l. B. ii. p. 215 (1870); Heugl. Orn. N. O. Afr. p. 781 (1871); Sharpe, Cat. Afr. B. p. 12 (1871); Gurney ed. Anderss. B. Dam. Ld. p. 228 (1872).

Cuculus capensis, Cuv. Règne An. i. p. 424 (1817, ex Levaill. nec Müll.).

Cuculus lineatus, Sw. B. W. Afr. ii. p. 178, pl. xviii. (1837).

Cuculus ruficollis, Heugl. Syst. Uebers. p. 49 (1856); id. J. f. O. 1864, p. 265.

Cuculus leptodetus, Cab. & Heine, Mus. Hein. Th. iv. p. 34 (1862).

Cuculus canorus (pt.), Schl. Mus. P. B. *Cuculi*, p. 6 (1864).

Adult male. Above bluish grey, rather glossed with brownish on the head and back, and decidedly clearer grey on the rump and upper tail-coverts, the lateral feathers of the last named being transversely spotted and barred with white; wing-coverts dark greyish brown, primary coverts and quills rather darker, especially the secondaries, which are glossed with greyish, the inner webs very distinctly barred with white; tail ashy grey, the outer feathers browner and all tipped with white, before which a distinct blackish bar crosses the end of the tail, this being much more distinct when viewed from underneath; the centre feathers marked with longitudinal drops of white along the shaft, these increasing in extent towards the outer feathers, which are also notched or spotted with white on the inner web, until on the last feather they form more or less perfect bars across the feather; sides of the face and entire throat bluish grey, rather lighter on the lores and fore part of the cheeks, the fore neck tinted with pale russet; remainder of under surface creamy white, transversely barred with greyish brown, these bars becoming more zig-zag in shape on the under tail-coverts; under wing-coverts white, with irregular cross markings of grey; axillary plumes white, barred like the breast; bill yellow on the lower mandible and on the base of the upper one, including the nostrils, becoming blackish on the edge of the culmen and the tip of both mandibles; feet yellow. Total length 12 inches, culmen 1·0, wing 8·5, tail 6·5, tarsus 0·85.

Hab. N.E. Africa: White Nile and Sobat; mountains of Wola-Galla, in April; Bari Negro Land, in February and March; Bongo, in August (*Heuglin*). S.W. Africa: Damara Land and Ovampo (*Andersson*). S. Africa: Caffraria (*Levaillant*); Natal (*Ayres*).

The present species is the resident Cuckoo of a certain part of Africa, representing our Cuckoo so closely that in some instances it is difficult to distinguish between them. Mr. John Henry Gurney, who examined my series, has given (Ibis, 1871, p. 103) an account of the differences between the two species; and a prolonged revision of the specimens he examined enables me to confirm his views. The most constant character is to be found in the beak; for whereas

in *C. canorus* the bill is for the most part blackish, in *C. gularis* it is yellow, only becoming black along the ridge and at the tip: thus the birds may always be separated by the nostrils, which are coloured according to the bill in the respective species, being yellow in *C. gularis* and black in *C. canorus*. Another difference exists in the tail; for owing to the great amount of white on that of *C. gularis* and to its forming bars on the outer feather, a very distinct band is observed across the tip of the tail, which is not visible in *C. canorus*. The accompanying woodcut exhibits the difference in the outer tail-feathers of the two Cuckoos, and shows the bar in *C. gularis*, which is found on all the other feathers.

Fig. 2.

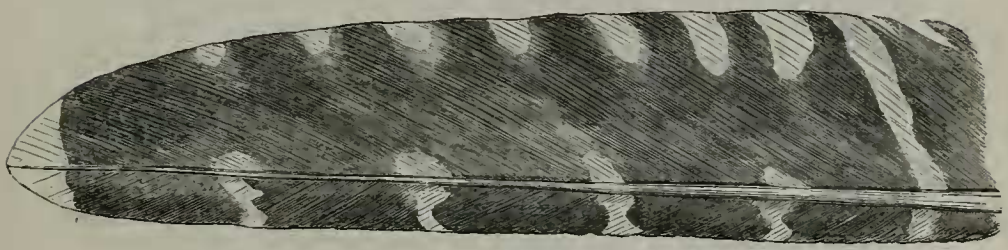


Fig. 3.

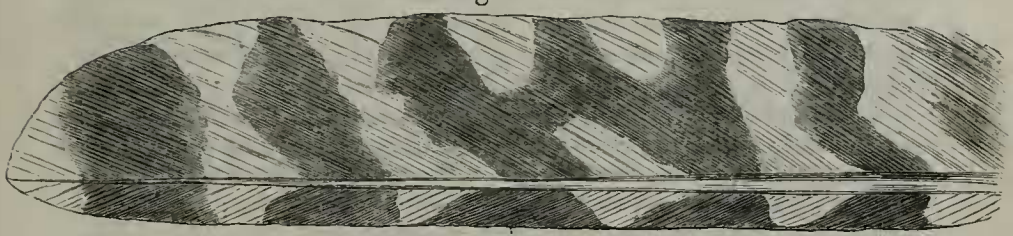


Fig. 2. Outer tail-feather of *C. canorus*.
Fig. 3. Outer tail-feather of *C. gularis*.

7. Cuculus clamosus.

Le Coucou criard, Levaill. Ois. d'Afr. v. pls. 204, 205; Sundev. Crit. om Levaill. p. 47 (1858).

Noisy Cuckoo, Lath. Gen. Syn. Suppl. ii. p. 136 (1801).

Cuculus clamosus, Lath. Ind. Orn. Suppl. p. xxx (1801); Steph. Gen. Zool. ix. pt. 1, p. 108 (1815); Cuv. Règne An. i. p. 425 (1817); Vieill. N. Dict. viii. p. 226 (1817); Less. Traité, p. 147 (1831); Bp. Consp. i. p. 103 (1850); Des Murs in Lefebvre, Voy. Abyss. Zool. p. 137 (1847); Hartl. J. f. O. 1854, p. 416; id. J. f. O. 1861, p. 265; Cab. & Heine, Mus. Hein. Th. iv. p. 43 (1862); Schl. Mus. P. B. *Cuculi*, p. 16 (1864); Anderss. P. Z. S. 1864, p. 3; Layard, B. S. Afr. p. 249 (1867); Bocage, Jorn. Lisb. ii. p. 46 (1868); Chapm. Trav. S. Afr. ii. p. 408 (1868); Gray, Hand-l. B. ii. p. 215 (1870); Heugl. Orn. N. O. Afr. i. p. 784 (1871); Anderss. B. Dam. Ld. ed. Gurney, p. 226 (1872).

Cuculus nigricans, Sw. Zool. Illustr. 2nd ser. vol. i. pl. 7 (1829); id. B. W. Afr. ii. p. 180 (1837); Gray, Gen. of B. ii. p. 463 (1847); Hartl. J. f. O. 1854, p. 416; id. Orn. W. Afr. p. 190 (1857); Gurney, Ibis, 1859, p. 246; Cab. & Heine, Mus. Hein. Th. iv. p. 441 (1862).

Surniculus nigricans, Bp. Consp. i. p. 105 (1850).

Cuculus chalybeus, Heugl. J. f. O, 1862, p. 34.

Coccystes nigricans, Cab. & Heine, Mus. Hein. Th. iv. p. 44, note (1862); Gray, Hand-l. B. ii. p. 220 (1870).

Coccystes serratus (pt.); Sharpe, Cat. Afr. B. p. 13 (1871, *err.*); id. Ibis, 1872, p. 68.

Oxylophus serratus, Gurney ed. Anderss. B. Dam. Ld. p. 226 (1872, *ex Sharpe, err.*).

Adult male.—Above glossy greenish black, with a slight shade of dull indigo on the interscapulary region; quills brown, the primaries whitish near the base of the inner web, where there are remains of brownish bars, the innermost secondaries greenish black like the back; tail greenish black, tipped with white, all the feathers more or less inclining to brown on the inner webs; under surface of body black, with a slight greenish gloss, not so glossy as the back, some of the under tail-coverts tipped with brownish white; bill black; feet yellow, claws black; iris dark brown. Total length, 12 inches; culmen 0·95; wing 7·2; tail, 6·2; tarsus 0·75.

Young.—Much browner than the adult, the wings paler; the under surface dusky, with remains of rufous bars on the chest, and of fulvous cross markings on the breast, the under tail-coverts tipped with white, and crossed with deep ochre bars; tail tipped with white, with indications of buffy white bars, nearly obsolete.

An apparently very young bird in my collection from Fantee has all the feathers narrowly edged with whitish, the breast white, with broad transverse cross bars of black, the inner web of the primaries barred with white, and the tail also spotted with white; bill horn-brown, yellowish brown on the under mandible.

N. E. Africa: only in one locality in the Anseba valley, in August and September, not noticed in May and July (*Heuglin*). W. Africa: Denkera (*Ussher*), Elmina, in April, and Amamoo, in May 1872 (*Blissett*). S. W. Africa: Biballa (*Anchieta*); Elephant Vley, Damara Land, Oct. 19 and Nov. 8, 1859 (*Andersson*). S. E. Africa: Natal (*Ayres*); Eland's Post and the Katberg (*Atmore*).

It seems that *C. nigricans* of Western Africa is inseparable from *C. clamosus* of South Africa. I fancied at first that the latter was a trifle the larger bird; but on examining my series, which is very complete, I find that although one of the Fantee examples measures only 6·5 in the wing, another measures 7·0, which surpasses some of the South-African specimens.

I have explained the cause of error by which this species came to be included by Mr. Gurney (*l. c.*) under the head of *Coccystes serratus*, in a note on the latter bird.

8. Cuculus smaragdineus.

Cuculus cupreus, Shaw (nec Bodd.), Mus. Lever. p. 157 (1792);

Vieill. et Oud. Gal. Ois. i. p. 33, pl. 42 (1825); Less. Traité, p. 154 (1831); Grill, Zool. Anteckn. p. 42 (1858).

Chalcites cupreus, Rüpp. Neue Wirb. Vög. p. 62 (1835).

Chalcites smaragdineus, Sw. B. W. Afr. ii. p. 191 (1837); Layard, B. S. Afr. p. 251 (1867); Gurney, Ibis, 1859, p. 246.

Chrysococcyx cupreus, Rüpp. Syst. Uebers. p. 96 (1845); Bp. Consp. i. p. 105 (1850); Heugl. Syst. Uebers. p. 48 (1856); Cab. & Heine, Mus. Hein. Th. iv. p. 8 (1862).

Cuculus smaragdinensis, Gray, Gen. B. ii. p. 463 (1847).

Cuculus splendidus, Gray, Gen. B. ii. p. 464 (1847, *ex Mus. Lever.*).

Chrysococcyx smaragdineus, Strickl. Contr. Orn. 1851, p. 135; Horsf. & Moore, Cat. B. Mus. E. I. Co. ii. p. 705 (1854); Hartl. J. f. O. 1855, p. 361; Hartl. Orn. W. Afr. p. 191 (1857); Gurney, Ibis, 1859, p. 246; Cab. & Heine, Mus. Hein. Th. iv, p. 10 (1862); Dohrn, P. Z. S. 1866, p. 329; Sharpe, Ibis, 1870, p. 58; Heugl. Orn. N. O. Afr. p. 774 (1870).

Chalcites intermedius, Verr. Rev. et Mag. de Zool. 1851, p. 259.

Chrysococcyx intermedius, Hartl. Orn. W. Afr. p. 191 (1857); Cab. & Heine, Mus. Hein. Th. iv. p. 8 (1862); Bocage, Jorn. Lisb. i. p. 143 (1867).

Adult male.—Above brilliant metallic emerald-green, the plumage having somewhat of a scaly and velvety appearance; wings and tail of the same metallic green as the head, this colour likewise extending over the sides of the face and throat as far as the fore neck; rest of under surface bright golden yellow, the under tail-coverts broadly barred with metallic green; the quills and tail glossed underneath with metallic green, the bases of the primaries whitish, the outer tail-feather also spotted on the outer web and tipped with white; under wing-coverts golden yellow, the outer ones green; bill greenish grey, blackish along the line of gape and at tip, malachite-green at angle of mouth; feet and bare orbits lead-colour; iris sometimes brown, sometimes greyish (*Heuglin*).

Female.—Different from the male. Above metallic green, thickly barred with rufous, the quills similarly marked, excepting on the primaries, where the bars are more or less obsolete, leaving the ground-colour brown, the quills brown underneath, very distinctly notched with rufous or rufous white; under surface of body metallic green barred with white, a little more narrowly on the under wing-coverts; tail brown, the middle feathers glossed with metallic green, and washed with rufous, the outer feathers white internally washed with rufous, and spotted near the tips and on the inner web with metallic coppery green.

Hab. N. E. Africa: Migratory with the rain; mountains of Abyssinia, Fazogl, and Galla countries, northwards to 16° or 17° N. lat. In Mareb Valley to 4000 feet, and on plateau of Central Abyssinia to 8000 or 9000 feet (*Von Heuglin*). W. Africa: river Gambia (*Mus. R. B. S.*); Casamanze (*Verreaux*); Fantee (*Ussher*); Elmina, April 1872 (*Blissett*); Princes' Island (*Dohrn*); St. Thomas (*Weiss*); Cameroons (*Mus. R. B. S.*); Gaboon (*Walker*); Angola

(*Monteiro*); Loanda (*Toulson*). S. Africa: Cape Colony (*Layard*); Knysna (*Victorin*); Natal (*Ayres*).

With regard to the bird described as the female I am following the usual information of collectors; but I am by no means certain that the sexes of these Golden Cuckoos are really different from each other, and I believe that the bird usually supposed to be the female is really the young. If the sexes do differ in plumage, it is an abnormality in the family, which would give additional weight to the generic separation of *Chrysococcyx* from *Cuculus*. The tiny nestling of the present species is in my collection from Cameroons, and indicates the colours of the full-grown young bird very successfully. Another one, a little older, has white bars on the head; but this seems either an individual or sexual peculiarity, as it is also visible in another full-grown young example. The first metallic plumage, though complete, seems to be more bronzy in appearance than the fully plumaged bird; and in this stage it was figured by Shaw in the 'Museum Leverianum,' and thence named by Mr. Gray *C. splendidus*. In this first green dress remains of immaturity often appear, especially in the primaries, which are notched with white on the inner web, becoming gradually entirely white as the bird grows older. Thus it often happens that a specimen apparently quite old may still be proved to have not long quitted the immature dress by these white notches on the first or shortest primary.

Gray's title of *splendidus*, though founded on the plate above alluded to without any indication of locality, has always been applied to the South-African bird, the distinctive character being the somewhat shorter tail. As will be seen by the accompanying measurements, the difference is so slight in some examples as to render it an unimportant character; and if the West-African and South-African birds are to be separated, *C. intermedius* from Gaboon must also be reinstated; and this would lead to great confusion where the characters are so slight. The plumage does not vary with locality; therefore it is better to consider that there exists only *one* species, but that the West-African examples are the finest, those from Gaboon are *sometimes* rather smaller, while those from South Africa are the least and have the shortest tails.

			Wing.	Tail.
1.	♂.	West Africa. Mus. Brit.	4·5	4·8
2.	♂.	West Africa. Mus. Brit.	4·7	5·0
3.	♂.	Fautee. Mus. R. B. S.	4·5	4·6
4.	♂.	Fantee. Mus. R. B. S.	4·3	5·2
5.	♂.	Accra (*Haynes*). Mus. R. B. S.....	4·3	4·75
6.	♂.	R. Gambia. Mus. R. B. S.	4·45	4·5
7.	♂.	Gaboon (*Walker*). Mus. R. B. S...	4·5	4·4
8.	♂.	Gaboon (*Walker*). Mus. R. B. S...	4·3	3·8
9.	♂.	S. Africa (*Layard*). Mus. R. B. S...	4·5	3·7
10.	♂.	Natal. Mus. Brit.	4·2	3·5
11.	♂.	Natal. Mus. Brit.	4·2	3·7

9. Cuculus cupreus.

Le Coucou vert-doré et blanc, Buff. Hist. Nat. Ois. vi. p. 385 (1779).

Coucou vert du Cap de Bonne Espérance, Montb. Pl. Enl. vi. pl. 657 (c. 1780).

Gilded Cuckoo, Lath. Gen. Syn. i. pt. 2. p. 527 (1782).

Cuculus cupreus, Bodd. Tabl. Pl. Enl. p. 40 (1783); Gray, Gen. B. ii. p. 463 (1847); Schl. Mus. P. B., *Cuculi*, p. 31 (1864).

Cuculus auratus, Gm. S. N. i. p. 421 (1788, *ex Lath.*); Bonn. et Vieill. Enc. Méth. p. 1337 (1823); Thienem. Abbild. Vogeleiern. t. xv. fig. 4 (1845–56); Grill, Zool. Anteckn. p. 43 (1858).

Le Coucou Didric, Levaill. Ois. d'Afr. v. p. 46, pls. 210, 211 (1806).

Lampromorpha chalcopepla, Vigors, P. Z. S. 1831, p. 92.

Chalcites auratus, Less. Traité, p. 152 (1831); Swains. B. W. Afr. ii. p. 187 (1837); Mont. Ibis, 1862, p. 337; Layard, B. S. Afr. p. 250 (1867); Gurney, Ibis, 1868, p. 163.

Cuculus chalcopeplus, Gray, Gen. B. ii. p. 463 (1847).

Chrysococcyx auratus, Bp. Consp. i. p. 105 (1850); Hartl. Orn. W. Afr. p. 190 (1857); Gurney, Ibis, 1859, p. 247; Mont. P. Z. S. 1865, p. 94; Antin. Cat. descr. Ucc. p. 84 (1865); Hartl. P. Z. S. 1867, p. 826; Bocage, Jorn. Lisb. i. p. 143 (1867); Gurney, Ibis, 1868, p. 467; Sharpe, Ibis, 1870, p. 58.

Chrysococcyx cupreus, Heugl. Peterm. Mitth. 1861, p. 26; Finsch & Hartl. Vög. Ostafr. p. 522 (1870); Blanf. Geol. & Zool. Abyss. p. 313 (1870); Sharpe, P. Z. S. 1870, p. 145; id. Cat. Afr. B. p. 13 (1871); id. P. Z. S. 1871, p. 605; Heugl. Orn. N. O. Afr. p. 776 (1871); Shelley, B. Egypt, p. 163 (1872); Gurney ed. Anderss. B. Dam. Ld. p. 228 (1872).

Lamprococcyx cupreus, Cab. & Hein. Mus. Hein. Th. iv. p. 11 (1862).

Lamprococcyx chrysochlorus, iid. ut suprà.

Lamprococcyx chrysites, Heine, J. f. O. 1863, p. 350.

Chalcites cupreus, Kirk, Ibis, 1864, p. 327.

Young.—Head uniform cinnamon-rufous, the sides of the neck scantily marked with metallic green, with a broad streak of white under the eye; upper surface of body dull metallic green, with a slight coppery appearance on the interscapulary region, with broad cross bars of pale cinnamon; quills deep cinnamon, barred with dull metallic green, the subterminal spot very large; tail also deep cinnamon with metallic green cross bars, the outermost feathers with four rounded spots of white on the outer web and two on the inner, one being terminal, the next feather with indications of white spots on the two apical bars of the inner web; under surface of body dull white, the throat washed with rufous and spotted with dull metallic green, these spots becoming fewer and smaller on the breast, but taking the form of bars on the sides of body and under tail-coverts; bill orange-brown.

The description of the young is taken from a specimen given to me by Mr. Monteiro, who obtained it in Angola. Governor Ussher, when in Fantee, likewise obtained a series of young birds, from which it would appear that the next stage is gained partly by a moult and partly by a change of feather, in this wise:—The metallic green of

the back spreads and occupies the rufous cross bars, while it is also apparent that the green bars on the tail, always irregular in shape, merge and occupy the whole feather. Below, the metallic shade of the spots becoming dimmed, the latter break up into frecklings and streaks, and finally disappear; but the bars on the sides become intensified, and more boldly developed. The greater coverts, which showed very slight indications of this change in the younger stage, now become conspicuously marked with white. The dark green portion of the outer tail-feather becomes much more pronounced than in the former stage. The change in colour on the head from cinnamon to purplish brown seems to take place by a moult, and not by a change of plumage as in the rest of the upper surface. Whether the full metallic dress is attained without any actual moult I have no evidence to show; but it seems to me by no means improbable.

Adult.—Above metallic green, changing to golden green, sometimes with a coppery gloss, according to the light; a streak down the fore part of the head, and a distinct eyebrow, white; ear-coverts coppery green; cheeks, sides of neck, and underparts white, the sides of the body as well as the under wing- and tail-coverts barred, the sides of vent streaked with dull metallic green; wings metallic green above, like the back, varying with the light, the inner greater wing-coverts and the quills externally spotted with white, the primaries more minutely; under surface of quills ashy brown, with oval spots or bars of white on the inner web; lateral upper tail-coverts externally white; tail metallic green, all except the two middle feathers tipped with white, the outermost spotted with white on both webs, vanishing towards the centre feathers; "bill dusky above, horny beneath; legs dusky; iris and orbit scarlet" (*Blanford*).

Total length 8·5 inches; culmen 0·7; wing 4·25; tail 3·4; tarsus 0·65.

Hab. N.E. Africa: Commonest of the Emerald Cuckoos, rarer on Upper White Nile and Blue Nile, and only a few examples obtained from Gondokoro and Fazogl. Appears early in rainy season, and leaves in September and October (*von Heuglin*). W. Africa: river Gambia (*Mus. R. B. S.*); Goree (*Mus. Lisb.*); Fantee (*Ussher*); river Volta (*Ussher*); Cameroons (*Crossley*); Gaboon (*Verreaux*); Kattenbella (*Sala*). S. W. Africa: Benguela (*Monteiro*); Damara Land (*Andersson*). S. Africa: The Karroo (*Victorin*); Natal (*Ayres*); Traansvaal (*Ayres*). E. Africa: Zanzibar (*Kirk*).

No difference has been shown to exist between the sexes of this little Cuckoo; and it is quite probable therefore that the birds said to be the females of *C. klaasi* and *C. smaragdineus* are after all only the young birds.

10. Cuculus klaasi.

Le Coucou de Klaas, Levaill. Ois. d'Afr. v. p. 53, pl. 212 (1806); Sundev. Crit. om Levaill. p. 47 (1858).

Cuculus klaasi, Steph. Gen. Zool. ix. pt. 1, p. 129 (1815); Gray, Hand-l. B. ii. p. 218 (1870).

Cuculus klaasii, Vieill. N. Dict. d'Hist. Nat. viii. p. 230 (1817); Bonn. et Vieill. Enc. Méth. iii. p. 1333 (1823); Licht. Verz. Doubl. p. 9 (1823); Grill, Zool. Anteckn. p. 43 (1868).

Chalcites klasii, Less. Traité, p. 153 (1831).

Chalcites klassii, Sw. B. W. Afr. ii. p. 189, pl. 21 (1837).

Chrysococcyx clasii, Rüpp. Syst. Uebers. p. 96 (1845); Heugl. Syst. Uebers. p. 48 (1856); id. Peterm. Mitth. 1861, p. 26.

Cuculus klasii, Gray, Gen. B. ii. p. 463 (1847); Schl. Mus. P. B. *Cuculi*, p. 30 (1864).

Chrysococcyx klaasi, Bp. Consp. p. 105 (1850); J. & E. Verr. Rev. et Mag. de Zool. 1855, p. 270; Hartl. J. f. O. 1861, p. 265; Finsch, J. f. O. 1867, p. 248; Bianc. Spec. Zool. Mosamb. p. 327 (1867); Bocage, Jorn. Lisb. ii. p. 46 (1868); Finsch & Hartl. Vög. Ostafr. p. 520 (1870); Blanf. Geol. & Zool. Abyss. p. 314 (1870); Sharpe, Ibis, 1870, p. 58; Gurney, ed. Anderss. B. Dam. Ld. p. 229 (1872).

Chrysococcyx claasii, Hartl. Orn. W. Afr. p. 190 (1857); Gurney, Ibis, 1859, p. 247; Heugl. J. f. O. 1864, p. 265; Sharpe, Cat. Afr. B. p. 13 (1871); Heugl. Orn. N. O. Afr, p. 778 (1871).

Lamprococcyx klaasi, Cab. & Heine, Mus. Hein. Th. iv. p. 12 (1862); Heine, J. f. O. 1863, p. 351.

Lamprococcyx resplendens, Heine, J. f. O. 1863, p. 350.

Chalcites klaasii, Layard, B. S. Afr. p. 250 (1867).

Adult male.—Above metallic green, changing with the light to fiery bronze and golden green; the sides of the face and of the neck as well as the wings coloured like the back and subject to the same reflexions; under surface of quills greyish brown, very numerously and distinctly notched on the inner web with white; four middle tail-feathers golden green, with a slight coppery reflexion, especially towards the tips, the other feathers white, with a spot of golden green near the tip of the outer web, and three or four of the same colour on the inner web; under surface of body pure white, with a few broad longitudinal streaks of golden green on the upper thigh-feathers, the sides of the upper breast also bright golden-green, like the back; "bill dusky; legs pale; feet brownish olive; iris brown; orbit very pale green" (*Blanford*). Total length 7·0 inches, culmen 0·7, wing 4·1, tail 3·2, tarsus 0·55.

Female.—Above brown, the head uniform; interscapulary region barred with dull rufous; rest of the upper surface barred with dull rufous and metallic green, broader and more distinct on the wing-coverts, narrower and less plain on the lower back, rump, and upper tail-coverts; quills brown, the secondaries coloured like the back, the primaries notched externally with pale rufous, under surface of quills ashy brown, deeply notched with pale rufous on the inner web; tail brown, with a subterminal spot of coppery green on the centre feathers, the next one glossed with copper-colour, and notched externally with pale rufous, the three outermost white, with a conspicuous spot of coppery green near the tip, and more or less remains of pale rufous notches and brown bars on the inner webs; ear-coverts

brown like the head; rest of under surface dull white, with narrow brown cross lines, the sides of the upper breast uniform brown; thighs barred with pale rufous and metallic green, like the back; under wing-coverts pale rufous, with brown cross lines.

Hab. N. E. Africa: much rarer than the other Emerald Cuckoos: Central Abyssinia in May, N. Abyssinia in August; Upper Nile in November (*Von Heuglin*); Lebka valley (*Blanford*). W. Africa: river Gambia (*Mus. R. B. S.*); Denkera, Fantee (*Blissett*); Cameroons (*Mus. R. B. S.*). S. W. Africa: Biballa (*Anchieta*). S. Africa: Natal (*Ayres*); Eland's Post (*Atmore*); Knysna and the Karroo (*Victorin*).

I presume that it is beyond doubt established that the bird which always passes with collectors as the female of this bird is really the adult of that sex; but there is considerable difference among them, and it would seem difficult to make out the adult stage of the hen bird. A specimen sent me by my friend Mr. Layard as the female of *C. claasi* differs from the one above described by me in having a dull rufous shade extending over the lower parts, with much more distinct cross bars; above a purplish gloss overspreads the bird from the head to the tail; and the green and rufous barring is confined to the scapulars and wings.

I cannot identify more than one species. South-African specimens are rather the larger, and have the wing 3·8–4·05 inches against 3·5–3·8 inches in West-African examples. The narrow bars on the flanks are the remains of immaturity, as also are the white notches on the inner web of the first primaries, which get fewer in number as the bird advances in age.

Genus 2. Coccystes.

	Type.
Coccystes, Gloger, Hand. u. Hilfsb. Naturg. p. 203 (1832)	*C. glandarius.*
Oxylophus, Swains. Classif. of B. ii. p. 322 (1837)	*C. cafer.*

Fig. 4.

Head of *Coccystes glandarius*.

Key to the species.

a. Abdomen whitish.
  a'. Above brown: an ashy-grey crest: wings spotted with white ..... 1. *glandarius*.
  b'. Above blackish: crest uniform with back: wings unspotted.
    a''. Throat white, conspicuously streaked with black ..... 2. *cafer*.
    b''. Throat white, like the breast ..... 3. *jacobinus*.
b. Abdomen black ..... 4. *serratus*.

1. Coccystes glandarius.

Cuculus glandarius, Linn. S. N. i. p. 169 (1766).

Bee Cuckoo, Bruce, Trav. Abyss. v. App. p. 179 (1790).

Coccyzus glandarius, Rüpp. N. W. Vög. p. 62 (1835); id. Syst. Uebers. p. 96 (1845).

Cuculus phaiopterus, Rüpp. in Mus. Lugd. (teste Schlegel: = juv.).

Oxylophus glandarius, Strickl. P. Z. S. 1850, p. 219; Hartl. Orn. W. Afr. p. 188 (1857); id. J. f. O. 1861, p. 265; Heugl. Peterm. Mitth. 1861, p. 25; Layard, B. S. Afr. p. 251 (1867).

Coccystes glandarius, Heugl. Syst. Uebers. p. 48 (1856); id. J. f. O. 1862, p. 34; Cab. & Heine, Mus. Hein. Th. iv. p. 44 (1862); Finsch & Hartl. Vög. Ostafr. p. 518 (1870); Gray, Hand-l. B. ii. p. 220 (1870); Sharpe, Ibis, 1870, p. 485; id. Cat. Afr. B. p. 12 (1871); Heugl. Orn. N. O. Afr. p. 786 (1871); Shelley, B. Egypt, p. 162 (1872); Gurney, ed. Anderss. B. Dam. Ld. p. 225 (1872).

Adult male. Above brown, somewhat inclining to olive-brown, the scapulars slightly, the wing-coverts and inner secondaries more conspicuously tipped with whitish; quills darker brown above, the inner primaries narrowly edged with whitish at the tips, the inner face of the quills whitish; lower back, rump, and upper tail-coverts brown like the back, the outermost of the latter white on the outer web, the inner ones tipped with white; tail brown, broadly tipped with white; crown of the head and crest bluish grey, with narrow blackish shaft-lines; sides of the face and hind neck rather darker brown, the ear-coverts washed with grey; throat and chest yellowish white, the former somewhat tinged with greyish, with indistinct hair-like blackish shaft-lines; rest of under surface purer white, the flanks shaded with greyish; under wing-coverts yellowish, the outer ones and the axillaries white, the latter somewhat shaded with ashy; bill brown, yellowish at base of lower mandible, feet bluish, shaded with brown; iris pale brown. Total length 15 inches, culmen 1·1, wing 8·15, tail 9, tarsus 1·3.

Adult female. Generally similar to the male, but having a faint rufous tinge on the inner webs of the primaries.

Young. Very different from the adult, and looking like another species. Above dark brown, the head and crest black; the wing-coverts scantily spotted with white; primaries rufous, the tips dusky brown, tipped with white, the first two primaries also brown on the outer web, the inner secondaries uniform with the back, and tipped with white; the external upper tail-coverts white on the

outer web; tail as in adult, but not so broadly tipped; throat and fore neck as well as under wing-coverts rich ochre; rest of under surface white, washed with ochre, the outer face of the thighs dusky brown.

Whether the female *always* differs, as I have described, in having a tinge of rufous on the primaries, I cannot say for certain, but such has been my experience in a large series of carefully sexed specimens. As, however, the amount of rufous varies, being sometimes more, sometimes less, it may not improbably be the remains of the rufous wing of the young bird.

Hab. N.E. Africa: Egypt (*Shelley*); common everywhere, found along the whole Nile valley to the Gazelle River and Djur, also in Bogos, Quola of Abyssinia, and on the Danakil and Somali coasts, as well as in most parts of Arabia—apparently resident (*Von Heuglin*); Kordofan (*Petherick*). W. Africa: river Gambia (*Mus. R. B. S.*); Kasamanze and Bissao (*Verreaux*); Cape Coast, Dec. 1869 (*Hinde*). S.W. Africa: Ovampo (*Andersson*); Damara Land and Okavango river (*Andersson*); Windvogelberg (*Bulger*); Kaffraria (*Layard*); Port Elizabeth (*Mus. R. B. S.*).

2. Coccystes cafer.

Cuculus cafer, Licht. Cat. Rer. Nat. Hamb. p. 14 (1793).

Variété du Coucou Edolio, Levaill. Ois. d'Afr. v. p. 44, pl. 209 (1806); Sundev. Crit. om Levaill. p. 47 (1858).

Cuculus afer, Leach, Zool. Misc. p. 72, pl. 31 (1814); Steph. Gen. Zool. ix. p. 115, pl. 24 (1815).

Coccyzus levaillantii, Sw. Zool. Illustr. 2nd ser. pl. 13 (1829).

Cuculus levaillantii, Less. Traité, p. 148 (1831).

Oxylophus vaillantii, Sw. B. of W. Afr. ii. p. 182 (1837).

Oxylophus ater, Rüpp. Syst. Uebers. p. 96 (1845); Bp. Consp. i. p. 102 (1850); Hartl. Orn. W. Afr. p. 188 (1857).

Oxylophus afer, Gray, Gen. B. ii. p. 464 (1847); Heugl. Syst. Uebers. p. 48 (1856); Layard, B. S. Afr. p. 253 (1867); Heugl. Orn. N. O. Afr. p. 790 (1870); Blanf. Geol. & Zool. Abyss. p. 312 (1870); Finsch, Tr. Z. S. vii. p. 285 (1870).

Coccystes afer, Cab. & Heine, Mus. Hein. Th. iv. p. 48 (1862); Schl. Mus. P.-B., *Cuculi*, p. 44 (1864).

Coccystes caffer, Sharpe, Ibis, 1870, p. 58; Gray, Hand-l. B. ii. p. 220 (1870); Sharpe, Cat. Afr. B. p. 13 (1871).

Oxylophus caffer, Gurney, ed. Anderss. B. Dam. Ld. p. 225 (1872).

Adult male. Above shining greenish black, the head deeper black and ornamented with a long crest of lanceolate feathers; lores and ear-coverts dull black; quills brown, the inner webs white at the base, the primaries also externally white at the base, causing a large alar speculum, the inner secondaries greenish black like the back; tail greenish black like the rest of upper surface, broadly tipped with white, the inner webs showing somewhat of a purple tinge; under surface of body buffy white, the feathers of the throat, breast, and under tail-coverts black in the centre, giving a thickly striped ap-

pearance, the flanks also somewhat mottled, with black centres to the feathers; under wing-coverts white, streaked with black, the lower ones entirely black; bill black; feet brown, tinged with lead-colour; iris dark olive. Total length 15·5 inches, culmen 1·1, wing 7·4, tail 10·2, tarsus 1·05.

Young. Above brown, the lower back and wing-coverts margined with pale rust-colour; crest brown, with a slight greenish tinge on some of the feathers; quills brown, with a purplish gloss on the inner secondaries; tail purplish brown, with a greenish gloss near the base, the two exterior feathers tipped with white on the outer web; under surface of body dull white, tinged with ochre on the abdomen and under tail-coverts, the throat and chest indistinctly marked with dull brown in the centre of some of the feathers; under wing-coverts buffy white, the lower ones blackish, the quills white at the base of the inner web only, showing no external alar speculum; bill horn-brown, the under mandible reddish.

The southern bird is the largest, measuring 7·4 in the wing. The northern ones measure 6·5–7·1, but there is no difference in plumage.

Hab. N.E. Africa: along the Nile northwards to Dongola, in Senaar and all over the White-Nile district (*Von Heuglin*); Upper Lebka and Anseba valleys (*Blanford*); Waliko and Gabenaweldt-gonfallon, August 1868 (*Jesse*). W. Africa: river Gambia (*Mus. R. B. S.*); Sierra Leone (*Fraser*); Fantee (*Ussher*); Denkera, Dec. 1871, and Jan. 1872 (*Blissett*). S.W. Africa: Damara Land, Elephant Vley, Nov. 1869, and Otjimbinque, March 1863 (*Andersson*). S. Africa: Swellendam (*Cairncross*); Limpopo river (*Wahlberg*).

My friend Mr. H. F. Blissett sent me the following note on a specimen which was obtained for him from the forest country of Denkera in the interior of Fantee:—"This I believe to be a very rare bird indeed. From what I can gather from Aubinn, he has only seen one before, which Governor Nagtlas sent to Holland. He calls it a Nightingale; and my own collector confirms the fact of its singing when the rain is coming on. It was shot in Denkera in December 1871; and I have ordered him to get some more specimens for you." Whether any credence can be given to the fact of this bird "singing" will be found some day by some European collector; for the native accounts are unfortunately very untrustworthy, and it is quite certain that its rarity was exaggerated by Aubinn to Mr. Blissett; for he obtained one or two examples for Governor Ussher, and sent at least one specimen to Mr. Higgins. Mr. Blissett's bird being in a peculiar state of change of plumage, Aubinn may have referred to it in the sense of only having seen one *exactly* similar bird; for I know by experience that birds of all kinds which differ in sex or in young plumage, are always considered by the natives to be distinct species.

3. Coccystes jacobinus.

Coucou huppe de la côte de Coromandel, Montb. Pl. Enl. vi. pl. 872 (1783).

Cuculus jacobinus, Bodd. Tabl. Pl. Enl. p. 53 (1783, ex Montb.).
Cuculus melanoleucus, Gm. S. N. i. p. 416 (1788, ex Montb.).
Le Coucou Edolio (femelle), Levaill. Ois. d'Afr. v. pl. 208 (1806); Sundev. Crit. om Levaill. p. (1858).
Cuculus serratus ♀, Steph. Gen. Zool. ix. p. 114, pl. 23 (1815).
Coccystes melanoleucus, Jerd. B. Ind. i. p. 339 (1862).
Coccystes pica, Cab. & Heine, Mus. Hein. iv. p. 46 (1862); Gray, Hand-l. B. ii. p. 220 (1870).
Coccystes jacobinus, Cab. & Heine, Mus. Hein. Th. iv. p. 45 (1862); Schl. Mus. P.-B., *Cuculi*, p. 44 (1864); Gray, Hand-l. B. ii. p. 220 (1870); Sharpe, Cat. Afr. B. p. 13 (1871).
Coccystes hypopinarius, Cab. & Heine, Mus. Hein. Th. iv. p. 47 (1862); Gray, Hand-l. B. ii. p. 220 (1870).
Oxylophus melanoleucus, Layard, B. S. Afr. p. 252 (1867); Ayres, Ibis, 1871, p. 261.
Oxylophus serratus, Bocage, Jorn. Acad. Lisb. ii. p. 46 (1868).
Oxylophus jacobinus, Finsch, Tr. Z. S. vii. p. 286 (1870); Blanf. Geol. & Zool. Abyss. p. 313 (1870); Heugl. Orn. N. O. Afr. p. 788 (1871); Gurney, ed. Anderss. B. Dam. Ld. p. 225 (1872).

Adult. Head, which is ornamented with a long crest, and entire upper surface glossy greenish black, the tail tipped with white; primaries brown, white at the base both internally and externally, forming a large white alar spot; sides of face black; under surface entirely dull white, with a yellowish tinge on the throat and breast; under wing-coverts yellowish white, the lower ones greyish; flanks shaded with dusky grey; bill and feet black; iris yellow. Total length 13·6 inches, culmen 1, wing 6·4, tail 8, tarsus 1·15.

Young. Brown, the quills paler; tail brown, tipped with white, the centre feathers glossed with greenish; a white alar spot as in adults; under surface of body entirely yellowish white, the lower under wing-coverts brown; bill horn-brown.

I cannot find any real difference between Indian and African specimens of this Cuckoo; and the measurements show that there is only one species.

Hab. N.E. Africa: probable migrant—Bogos in August, Senaar in September, Chartum and Berber in November (*Von Heuglin*); Anseba valley (*Blanford*); Autrub on the Blue Nile (*Antinori*); Ambukol in Nubia (*Ehrenberg*). E. Africa: Mombas (*Wakefield*). S. Africa: Tette (*Livingstone*); Natal, Transvaal (*Ayres*); Eland's Post (*Atmore*); Lake N'gami (*Andersson*). S.W. Africa: Damara Land (*Andersson*); Biballa (*Anchieta*).

The adult specimen described was a Damara skin; and it is from this and the adjoining region that the largest specimens come. The difference in general bulk and in length of tail is very great, even in specimens from the same locality.

	Long. tot.	Alæ.	Caud.
1. ♀. Natal. Ayres	11·5	5·90	7·1
2. Transvaal. Ayres	12·3	6·15	7·4
3. Tette. Livingstone	11·7	5·65	6·9
4. Damara Land. Andersson	12·0	6·35	7·8
5. „ „ „	13·6	6·4	8·0
6. Biballa. Anchieta	14·0	6·0	7·6
7. „ „	14·0	6·6	7·8
8. ♂. Elands' Post. Atmore	11·8	6·05	7·3
9. ♂. Waliko. Blanford	12·7	5·75	7·3
10. Simla. Thompson	10·8	5·75	6·8
11. Lahore. Marshall	12·2	6·2	7·3
12. Nepal. Hodgson	12·4	6·0	7·4
13. „ „	12·6	5·8	7·3
14. „ „	12·9	6·0	7·2
15. „ „	11·4	5·85	7·0
16. Pegu. Blanford	12·4	5·9	7·2

Many ornithologists have followed Levaillant in considering this and *Coccystes serratus* to be sexes of one and the same bird. Independently of Mr. Layard's testimony that they are not equally common in the parts of South Africa they inhabit, the best answer that can be given to this supposition is that in Abyssinia and in India the Black-crested Cuckoo never occurs *at all*.

4. Coccystus serratus.

Crested Black Cuckow, Lath. Gen. Syn. i. pt. 2, p. 519 (1782).

Cuculus serratus, Sparrm. Mus. Carls. fasc. i. pl. 3 (1786); Sundev. Crit. Sparrm. p. 4 (1858).

Cuculus ater, Gm. S. N. i. p. 415 (1788, ex Lath.).

Le Coucou Edolio (male), Levaill. Ois. d'Afr. v. p. 39, pl. 207 (1806); Sundev. Crit. om Levaill. p. 47 (1858).

Cuculus edolius ♂, Cuv. Règne Anim. i. p. 425 (1817); Less. Traité, p. 148 (1831).

Oxylophus edolius, Sw. Classif. B. ii. p. 322 (1837); Layard, B. S. Afr. p. 252 (1867).

Oxylophus serratus, Gray, Gen. B. ii. p. 464 (1847); Blyth, Cat. B. Mus. As. Soc. B. p 74 (1849); Bp. Consp. i. p. 102 (1850); Gurney, Ibis, 1859, p. 246; Ayres, Ibis, 1869, p. 297.

Coccystes serratus, Cab. & Hein. Mus. Hein. Th. iv. p. 47 (1862); Schl. Mus. P.-B., *Cuculi*, p. 45 (1864); Gray, Hand-l. B. ii. p. 220 (1870); Sharpe, Cat. Afr. B. p. 13 (1871).

Adult male. Above glossy greenish black, with a long crest of the same colour; under surface of body also greenish black, but a little duller than the back; quills brownish, the secondaries glossed with green like the back, the primaries white at the base of both webs, forming externally a very large alar speculum; tail greenish above, inclining to purplish brown underneath; bill black; tarsi slate-coloured; iris nearly black. Total length 12·5 inches, culmen 1·0, wing 6·15, tail 7·6, tarsus 1·05.

Hab. "Abundant in the Karroo, extends into the Cape peninsula and has been received from all parts of the colony to the eastward" (*Layard*); Graham's Town (*T. C. Atmore*); Kaffraria (*Mus. Hein.*); Natal and Transvaal (*T. Ayres*).

The birds in my collection supposed to be of this species from Damara Land are really *Cuculus clamosus*, and were labelled wrongly by a friend who was assisting me in arranging my collection at the time. During my absence the birds got mixed; and not being an ornithologist, he labelled all the black Cuckoos by one name. Hence arose the mistake, for which I am responsible, of giving *C. serratus* as a Damara species in Andersson's book.

Subfam. 2. Phœnicophaïnæ.

Having been forced to study the other genera of this subfamily in order to determine the exact position of the two African species, I give here the notes I made with a view to help any future student of the group. The study of the *Phœnicophaïnæ* is attended with considerable difficulty, owing rather to the variability of the structural characters in a more or less important degree, than to the specific similarity of the birds included in the subfamily.

As far as can be determined by external characters, it is impossible to find grounds for the separation of so many subfamilies as Mr. Gray admits in his 'Handlist;' nor can I quite acquiesce in the arrangement of the genera proposed by him. *Carpococcyx* exhibits a direct tendency to *Neomorphus*, from which it can scarcely be distinguished except by its smaller development of crest and bare face. Anatomy may one day bring to light some sounder grounds of division; but at present it seems hopeless to attempt to place these American Cuckoos far from the Malayan *Phœnicophaïnæ*. The latter subfamily appears to me to contain the following Old-World genera, the numbers being taken from the 'Handlist.'

2195. *Phœnicophaes.*
2196. *Rhamphococcyx.*
2197. *Dasylophus.*
2198. *Lepidogrammus* (*Leptogrammus*, err.).
2199. *Carpococcyx.*
2200. *Zanclostomus.*
2201. *Ceuthmochares.*
2202. *Taccocua.*
2203. *Rhopodytes* (*Rhododytes*, err.).
2204. *Rhinortha.*
2205. *Coua* (=*Sericosomus*).

So that it will be seen that I adopt nearly all Mr. Gray's generic and subgeneric divisions. Indeed some of the latter are in my mind more thoroughly distinguishable than the genera he recognizes. I propose the following arrangement:—

a. Feathers of the breast with distinctly stiffened and glossy shafts ..... *a*. *Taccocua*.
b. Breast-feathers ordinary.
a'. Head and throat ornamented with metallic horny tips to the feathers ..... *β*. *Lepidogrammus*.
b'. Head and throat ordinary, with no metallic tips.
a''. Line of gape longer than the tarsus.
a'''. Nostrils hidden by small feathers..... *γ*. *Dasylophus*.
b'''. Nostrils not hidden.
a''''. Bill almost straight, as also is the gonys..... *δ*. *Rhinortha*.
b''''. Bill conspicuously curved, the line of gape following the curve of the bill.
aa. Nostrils rounded, or slightly oval in shape. *ε*. *Rhopodytes*.
bb. Nostrils more or less linear.
aa'. Nostrils placed basally in a large groove. *ζ*. *Rhinococcyx*.
bb'. Nostrils simple, not placed in a groove.
aa''. Nostrils straight.
aa'''. Bill higher than broad, measured at gape.
aa''''. Lores and sides of face bare, papillose ..... *η*. *Phœnicophaes*.
bb''''. Lores feathered ; sides of face bare and smooth ..... *θ*. *Rhamphococcyx*.
bb''', Bill broader than high..... *ι*. *Zanclostomus*.
bb''. Nostrils ascending ..... *κ*. *Poliococcyx*.
cc''. Nostrils descending ..... *λ*. *Ceuthmochares*.
b''. Line of gape shorter than tarsus.
a'. Nail of the hind toe curved, shorter than the hind toe itself.
a''. Height of bill less than its breadth.
a'''. Distance from the fore part of eye to the fore part of nostril greater than the distance from the latter part to tip of beak *μ*. *Carpococcyx*.
b'''. Distance as above measured less than from the nostril to tip of beak ..... *ν*. *Sericosomus*.
b''. Height of bill equal to its breadth..... *ο*. *Cochlothraustes*.
b'. Nail of hind toe straight, like that of a Lark, always equal to, and generally surpassing, the hind toe itself..... *π*. *Centropus*.

Genus 1. Taccocua. (Fig. 5, p. 602.)

Type.

Taccocua, Less. Traité d'Orn. p. 144 (1831) .. *T. leschenaulti*.
Acentetus, Cab. & Heine, Mus. Hein. Th. iv. p. 102 (1862)..... *T. infuscata*.

Evinces great affinity to *Centropus*, not only in coloration, but especially in the stiffened shafts to the breast-feathers.

Genus 2. Lepidogrammus. (Fig. 6, p. 602.)

Type.

Lepidogrammus, Reich. Syst. Av. Nat. pl. xlvii., fig. 4 (1849) ..... *L. cumingi*.

Distinguished by its somewhat Turacine aspect, the contour of the crest being rounded, and the feathers curving over the nasal openings, which they hide from sight. Above all remarkable for the horny appendages to the feathers of the head.

Fig. 5.

Head of *Taccocua leschenaulti*.

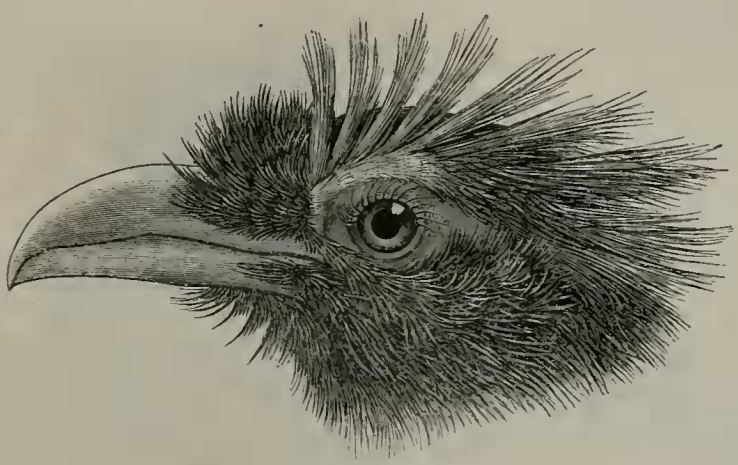
Fig. 6.

Head of *Lepidogrammus cumingi*.

Genus 3. Dasylophus. Type.

Dasylophus, Swains. Classif. B. ii. p. 324 (1837) *D. superciliosus*.

Fig. 7.



Head of *Dasylophus superciliosus*.

Resembles *Lepidogrammus* in having the nostrils hidden by bristles, but is otherwise very like the more typical *Phœnicophaïnæ*. Distinguished from its allies by the crested superciliary feathers, which seem to be an extreme development of the hairy bristles noticed on some of the other genera.

Genus 4. Rhinortha. Type.

Rhinortha, Vigors, Mem. Raffl. p. 671 (1830) .. *R. chlorophæa*.
Bubutus, Less. Traité d'Orn. p. 143 (1831) ... *R. chlorophæa*.
Anadœnus, Swains. Classif. B. ii. p. 324 (1837) .. *R. chlorophæa*.
Idiococcyx, Boie, 1838 (ubi?).

Fig. 8.

Head of *Rhinortha chlorophæa*.

Remarkable for its straightened bill, as seen in the woodcut.

The sexes differ conspicuously—an unusual character in this subfamily.

Genus 5. Rhopodytes. Type.

Rhopodytes, Cab. & Heine, Mus. Hein. Th. iv. p. 61 (1862). *R. diardi*.

Fig. 9.

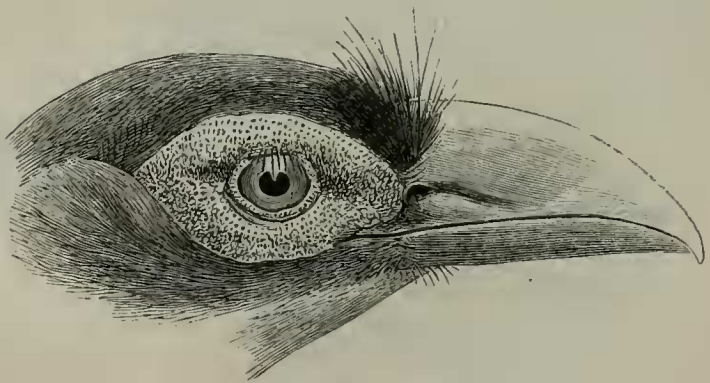
Head of *Rhopodytes diardi*.

The species which I would place in this genus are the following:—typical—*R. diardi*, *R. tristis*, *R. viridirostris*, *R. borneensis*; less typical—*R. erythrognathus*, *R. æneicaudus*. All these have stiff bristles on the forehead, and the bare face is highly rugose: in *R. diardi* the bristles on the head and neck are wonderfully developed. All of them have rounded nostrils; but the two last-mentioned birds are scarcely typical, as the bare face extends to the nostril, and is not separated, as in *R. diardi*, by a narrow loral line of feathers. It is possible that a comparison of the birds in spirits would discover other differences.

Genus 6. Rhinococcyx, gen. nov.

Although *Phœnicophaes curvirostris*, which I make the type of this new genus, bears the greatest resemblance to *Rhopodytes erythrogna-*

Fig 10.



Head of *Phœnicophaes curvirostris*.

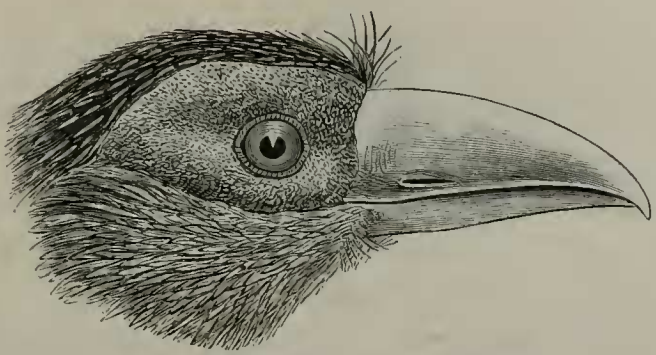
thus, so much that, as Lord Walden has pointed out, they are scarcely to be separated specifically, I must point to the well-marked *structural* difference of the nostril as a good generic character. The out-

ward resemblance between these two birds is probably due to some other cause.

Genus 7. Phœnicophaes.

	Type.
Phœnicophaus, Vieill. N. Dict. xviii. p. 461 (1817)	*P. pyrrhocephalus.*
Melias, Gloger, Handb. Naturg. p. 202 (1842)	?
Alectorops, J. & E. Verr. Rev. et Mag. de Zool. 1855, p. 355	*P. pyrrhocephalus.*

Fig. 11.



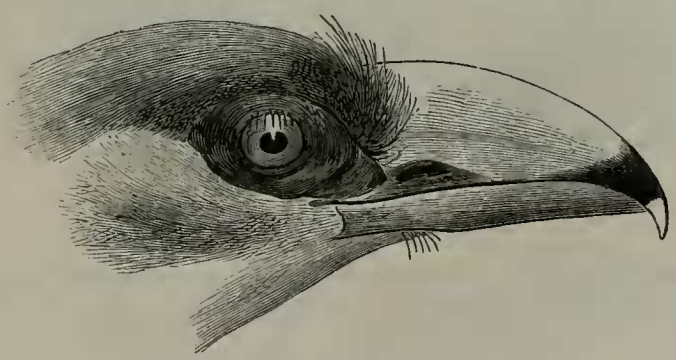
Head of *Phœnicophaes pyrrhocephalus.*

Remarkable for the gallinaceous appearance of the face, whence M. Verreaux derived his well-chosen name. The nostril is exposed as in no other genus of the *Phœnicophaïnæ*.

Genus 8. Rhamphococcyx.

	Type.
Rhamphococcyx, Cab. & Heine, Mus. Hein. Th. iv. p. 65 (1862)	*R. calorhynchus.*

Fig. 12.



Head of *Phœnicophaes calorhynchus.*

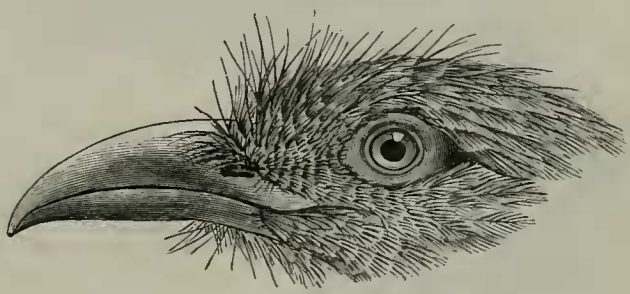
Although bearing some resemblance to *Rhinococcyx* and the aberrant members of *Rhopodytes*, this genus differs from all in the

smoothness of the bare face, while the feathers descend over the lores, thereby overhanging the nostril. To true *Phœnicophaes* it is allied by the shape of the nostrils, but differs in its smooth face and feathered lores, while it even shows slight indications of a nasal groove, which is an approach to *Rhinococcyx*.

Genus 9. Zanclostomus. Type.

Zanclostomus, Swains. Classif. B. ii. p. 323 (1837) *Z. javanicus*,

Fig. 13.



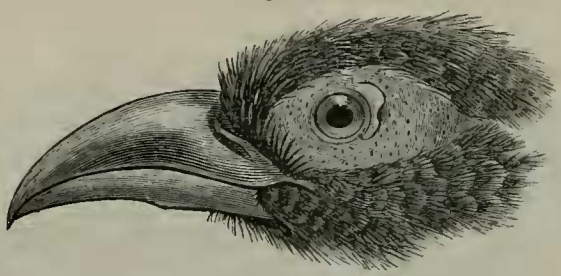
Head of *Zanclostomus javanicus*.

This genus has a long and slender bill compared with the other members of the subfamily, much widened at the base, where it is broader than it is high. The lores and sides of face are feathered, much reducing the bare space, which is not rough.

Genus 10. Poliococcyx, gen. nov.

The type of this genus is *P. sumatranus*, which differs from all the others in its curiously ascending nostrils. It much resembles

Fig. 14.



Head of *Poliococcyx sumatranus*.

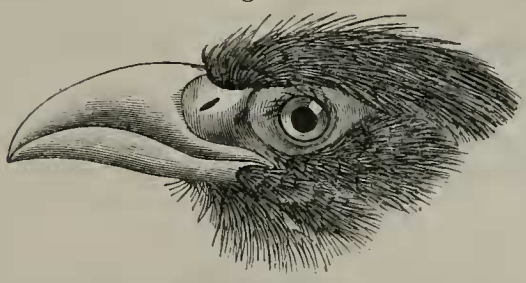
R. diardi in general characters, even to the narrow line of loral feathers skirting the base of the beak and separating the latter from the bare face.

Genus 11. Ceuthmochares.

Ceuthmochares, Cab. & Heine, Mus. Hein. Th. iv. p. 60 (1862) ..... Type. *C. aëneus*.

Confined to Africa, but evidently having direct affinity with

Fig. 15.



Head of *Ceuthmochares aëneus*.

Rhopodytes and its allies. It differs from all, however, in its bare horny face and lores, and in the downward direction of its nostrils.

Genus 12. Carpococcyx.

	Type.
Calobates, Temm. Pl. Col. iii. pl. 538 (1832, nec Kaup)	*C. radiatus*.
Carpococcyx, Gray, List Gen. B. p. 56 (1840) ..	*C. radiatus*.

Not far removed from *Sericosomus*, from which it is chiefly distinguished by its long and somewhat differently shaped bill. The nostril is rather more exposed than in the other; but the resemblance is otherwise very close.

Fig. 16.

Head of *Carpococcyx radiatus*.

Mr. Wallace tells me that when alive this bird closely mimics a Pheasant in appearance and gait. Indeed the Cuckoos, being some of the weakest of birds, mimic stronger families. Every one is acquainted with the general resemblance of our common Cuckoo to a Hawk, a resemblance so perfect that even small birds appear not to appreciate the distinction, and pursue them indiscriminately. Again the resemblance of *Surniculus dicruroides* to a *Dicrurus* is

another striking instance of mimicry—perhaps the most perfect in the whole class of birds.

Genus 13. Sericosomus.

	Type.
Serisomus (lege *Sericosomus*), Sw. Classif. B. ii. p. 323 (1857)	*S. cristatus.*
*Coua**, auct. (nec Cuvier).	
Glaucococcyx, Cab. & Heine, Mus. Hein. Th. iv. p. 71 (1862)	*S. cæruleus.*

Fig. 17.

Head of *Sericosomus cæruleus.*

Fig. 18.

Head and foot of *Cochlothraustes delalandi.*

* Cuvier, to whom the establishment of this well-known and long-used name has been credited, never used it as a genus (*cf.* Règne An. i. p. 425). I cannot separate *Glaucococcyx* of Cabanis and Heine, as the type (*G. cæruleus*), though aberrant in coloration, seems to be a typical species as regards structure.

Genus 14. Cochlothraustes. (Fig. 18, p. 608.)

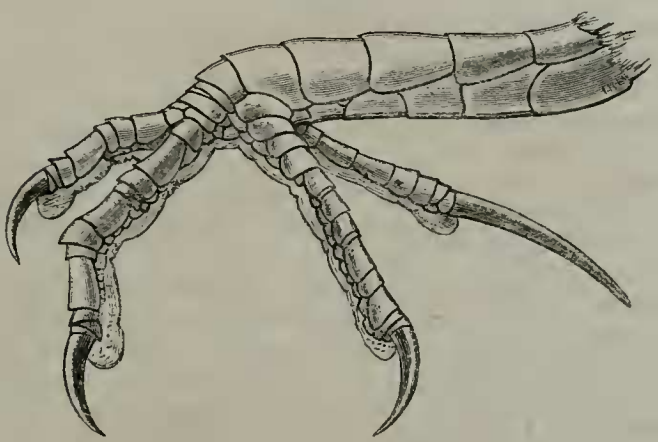
Cochlothraustes, Cab. & Heine, Mus. Hein. iv. p. 74 (1862) ..... Type. *C. delalandi.*

Differs from *Sericosomus* in form of bill, which approaches that of *Centropus*.

Genus 15. Centropus.

Centropus, Illiger, Prodr. Syst. Av. p. 205 (1811). Type. *C. ægyptius.*
Corydonyx, Vieill. Nouv. Dict. d'Hist. Nat. xxxiv. p. 294 (1819) ..... *C. toulou.*

Fig. 19.



Foot of *Centropus ægyptius*.

I defer till another occasion a fuller consideration of this genus, which requires much careful study; but I believe that it will be possible ultimately to define only one good genus.

Genus 3. Ceuthmochares.

(*Vide suprà*, p. 606.)

Key to the species.

a. Tail green, with slight bluish reflexions ..... 1. *australis.*
b. Tail with purple and violet reflexions ..... 2. *aëneus.*

1. Ceuthmochares australis, sp. nov.

Zanclostomus æneus, Gurney, Ibis, 1859, p. 248 (*lapsu*).

Zanclostomus æreus, Hartl. Faun. Madag. p. 63 (1861); Kirk, Ibis, 1864, p. 327; Layard, B. S. Afr. p. 247 (1867); Schl. & Poll. Faun. Madag. Ois. p. xvi (1868); Gray, Hand-l. B. ii. p. 206 (1870); Finsch & Hartl. Vög. Ostafr. p. 525 (1870); Sharpe, Cat. Afr. B. p. 14 (1871).

Phænicophaes æreus, Schl. Mus. P.-B. *Cuculi*, p. 50 (1864).

Adult. Head and hinder part of neck ashy grey, with a slight wash of olive; back dull metallic olive-green, shading into oily green on the rump and upper tail-coverts; wing-coverts uniform

with the back, as also are the quills, the under surface of the wing being ashy brown with a very faint shade of greenish; tail metallic oily green, the two middle feathers having a slight shade of bronze; sides of face, throat, and fore part of chest whitish, with a yellowish shade; lower part of belly greyish, the under tail-coverts metallic green; bill yellow, with a brown mark at base of culmen; iris beautiful dark red. Total length 13·5 inches, culmen 1·2, wing 4·9, tail 8, tarsus 1·15.

Hab. Natal (*Ayres*); Caffraria (*Wahlberg*); Zambesi (*Dickerson*); Bay of Bombatoc, Madagascar (*Bojer*).

The description is taken from a Natal specimen in my collection. Another bird in my possession from the same country has some of the tail-feathers very much worn, and although in perfect plumage everywhere else it still carries these old feathers in the tail: their ends are abraded; and they have faded to a brownish colour, with a slight greenish gloss on the inner web. This bird has also a rusty tinge on the thighs. Another example, also from Natal, is apparently younger, as it has the bill of a dull yellow colour, the whole of the culmen along the ridge and towards the tip brownish, and the chest is somewhat shaded with olive; on the lower breast there is a shade of rust-colour.

The range of this species, so far as I know, only extends from Natal to the Zambesi; but Speke collected a Cuckoo of this genus in Uzaramo (*cf.* Sclater, P. Z. S. 1864, p. 112), which may probably be the southern species. Heuglin includes *C. aëneus* in his great work on the strength of this specimen, but he describes the southern bird.

2. Ceuthmochares aëneus.

Le Coucou gris bronzé, Levaill. Ois. d'Afr. v. p. 60, pl. 521 (1806); Sundev. Crit. om Levaill. p. 48 (1858).

Metallic Cuckow, Lath. Gen. Hist. iii. p. 274 (1822).

Bronzed Cuckow, id. *l. c.* p. 294 (1822).

Cuculus aëreus (err. pro *aëneus*), Vieill. N. Dict. d'Hist. Nat. viii. p. 229 (1817, ex Levaill.).

Zanclostomus flavirostris, Swains. B. W. Afr. ii. p. 83, pl. 19 (1837); Fraser, P. Z. S. 1843, p. 52; Gray, Gen. B. ii. p. 460 (1845); Bp. Consp. i. p. 98 (1850); J. & E. Verr. Rev. et Mag. de Zool. 1855, p. 176; Gray, Hand-l. B. ii. p. 206 (1870); Sharpe, Cat. Afr. B. p. 14 (1871); id. P. Z. S. 1871, p. 605.

Zanclostomus æreus, Hartl. Orn. W. Afr. p. 187 (1857); Cass. Pr. Phil. Acad. 1859, p. 142; Mont. P. Z. S. 1860, p. 112; Sharpe, Ibis, 1869, p. 194.

Zanclostomus æneus, Hartl. P. Z. S. 1860, p. 112.

Ceuthmochares æreus, Cab. & Heine, Mus. Hein. Th. iv. p. 60 (1862).

Phænicophaes flavirostris, Schl. Mus. P.-B. *Cuculi*, p. 50 (1864).

Adult. Entire upper surface purplish blue, with violet reflexions,

the head and hinder neck scarcely glistening and shaded with greyish, as also is the side of the face; cheeks, throat, and ear-coverts cindery grey, a little inclining to whitish on the chin; wings and tail purple and violet, like the back; lower parts of body deep grey, with a faint reflexion of steel-blue; bill yellow; space round eye turqoise-blue; iris dark red. Total length 12 inches, culmen 1·1, wing 4·5, tail 7·7, tarsus 1·15.

Young. Altogether duller in colour than the adult, and everywhere more greyish, with less metallic lustre. The under parts are grey, paler on the throat; under mandible brownish.

Hab. Senegal ? (*Hartlaub*); Sierra Leone (*Afzelius*); Fantee (*Ussher, Blissett*); Cameroons (*Crossley*); Fernando Po (*Fraser*); Gaboon (*Walker*); Ogobai, Rembo, and Moonda rivers (*Du Chaillu*); Angola (*Monteiro*).

I strongly suspect that there are two species confounded still under this name; for I find that all the birds from Fantee have dark purplish-blue tails, while the more southern birds from Cameroons, Gaboon, and Fernando Po are more green everywhere, but especially on the upper tail-coverts and tail. One bird collected in Fernando Po by Mr. Fraser is remarkable for its light ash-coloured head and breast. My reason for not separating these birds is that I have one specimen from Gaboon with a purplish tail and another with a greenish one, so that after all it may be a sexual distinction. On the other hand, I must have seen at least twenty specimens from Fantee, all of which had purple tails, and that the difference is not caused by age is proved by young and old birds in my collection which have the tails exactly alike. The young bird described is one of Du Chaillu's specimens; and the description of the adult is taken from a nicely prepared skin given me by my friend Mr. Blissett, whose collector procured it in Denkera, in January 1872.

Dr. Hartlaub, in his work on the birds of Western Africa (p. 189), states his opinion that there is no specific difference between *C. australis* of South Africa and the bird from Western Africa, which is the true *C. aëneus* of Vieillot founded on Levaillant's plate. Again, in the great work by Dr. Finsch and himself on the ornithology of Eastern Africa, the two species are united, the synonymy of the green and blue-tailed birds being, however, kept distinct. In both these works the statement is made that examples of both forms occur in Southern and Western Africa. I must say, on the other hand, that among the numbers of *Ceuthmochares* I have seen, the differences in colour are coincident with locality, and unfailingly so. *C. aëneus* is rather smaller than *C. australis*, and has a slightly more curved bill, as Professor Schlegel has remarked: the principal differences, however, are the green tail and yellowish-white throat of the South-African bird, as distinguished from the violet tail and greyish throat of *C. aëneus*. Prof. Schlegel has likewise pointed out the russet tint on the belly noticed in one of my own specimens; and this, though probably existing only in mature birds, may yet prove to be another specific character.

Genus 4. Sericosomus*.

(*Vide suprà*, p. 608.)

Key to the species.

a. Throat not uniform with breast.
  a'. Throat bluish grey, like the upper surface.
    a''. Belly buff, under tail-coverts very little darker ..... 1. *eristatus.*
    b''. Belly pure white; under tail-coverts rich tawny, in strong contrast ..... 2. *pyropygus.*
  b'. Throat ochraceous ..... 3. *cursor.*
  c'. Throat buffy white.
    a''. Lower back and rump olive-green, like the back.
      a'''. Largest: lower abdomen and under tail-coverts black ..... 4. *gigas.*
      b'''. Smaller: lower abdomen and under tail-coverts lilac-brown ..... 5. *coquerelli.*
    b''. Lower back and rump dull lilac.
      c'''. Head bright rufous ..... 6. *ruficeps.*
      d'''. Head brownish olive ..... 7. *olivaceiceps.*
  d'. Throat black; breast chestnut ..... 8. *serrianus.*
b. Throat uniform with breast.
  a'. Crown tawny ..... 9. *reynaudi.*
  b'. Crown blue, like back ..... 10. *cæruleus.*

1. Sericosomus cristatus.

Le coucou huppé de Madagascar, Briss. Orn. iv. p. 149, pl. xii. fig. 2 (1760); Montb. Pl. Enl. vi. pl. 589 (1783).

Cuculus cristatus, Linn. S. N. i. p. 171 (1766).

Le Coua (male), Levaill. Ois. d'Afr. v. p. 67, pl. 217 (1806); Sundev. Crit. om Levaill. p. 48 (1858).

Coccyzus cristatus, Bonn. et Vieill. Enc. Méth. iii. p. 1346 (1823); Less. Traité, p. 139 (1831).

Serisomus cristatus, Sw. Classif. B. ii. p. 323 (1837); A. Newt. P. Z. S. 1865, p. 834.

Coua cristata, Gray, Gen. B. ii. p. 454 (1846); Bp. Consp. i. p. 109 (1850); Hartl. Faun. Madag. p. 62 (1861); Roch & E. Newt. Ibis, 1863, p. 166; Schl. P. Z. S. 1866, p. 424; Grand. Rev. et Mag. de Zool. 1867, p. 392; Schl. & Poll. F. M. Ois. p. 56 (1868); Gray, Hand-l. B. ii. p. 208 (1870); Sharpe, P. Z. S. 1870, p. 399; id. Cat. Afr. B. p. 14 (1871).

Sericosomus cristatus, Cab. & Heine, Mus. Hein. Th. iv. p. 72, note (1862), Cab. in Von der Decken, Reise, iii. Vög. p. 39 (1869).

Cua cristata, Schl. Mus. P.-B., *Cuculi*, p. 46 (1864).

* Sericosomus verreauxi.

Coua verreauxi, Grand. Rev. et Mag. de Zool. 1867, p. 86 (descr. orig.); Gray, Hand-l. ii. p. 208 (1870).

Whether this is a good species or not I do not know. No mention is made of it by M. Grandidier in his second article on Madagascar birds (*tom. cit.* p. 390). His original description is as follows:—

Occipital crest composed of feathers 0·4 in. long, cinereous at base, at the tip steel-green, above ashy greenish; quills bright greenish, with a golden lustre; tail-feathers bluish, the lateral ones terminated with white; throat and breast cinereous; vent and under tail-coverts white.

Adult. Above cinereous, glossed with metallic green, the head conspicuously crested; secondaries metallic green, shading into bluish at the tips; the primaries deep metallic blue, externally shaded with purple; tail purplish blue, the two centre feathers with a slight greenish shade, all the others tipped with white, the outermost more broadly; throat and sides of the face clear cinereous; fore neck and chest lilac rufous shading into ochre on the breast; rest of under surface white, washed with yellowish on the sides of the body and under tail-coverts; "orbital space violet-blue, sky-blue at external margin; tarsi grey; iris red" (*Grandidier*).

Total length 15 inches, culmen 0·9, wing 5·8, tail 8·5, tarsus 1·7.

Hab. N.W. Madagascar (*Pollen and Van Dam*); Nossi-bè (*Von der Decken*).

2. Sericosomus pyropygus.

Coua pyropyga, Grand. Rev. et Mag. de Zool. 1867, p. 86.

Closely allied to *S. cristatus*, but having the under tail-coverts in the adult of a very pronounced tawny colour, and having the white terminal band on the tail double as broad as in true *S. cristatus*.

Hab. South-western Madagascar.

This bird I saw in the Leiden Museum; and it seemed to me to be quite a good species. M. Grandidier says that the colour of the under tail-coverts, though apparently a slight, is quite a constant character; and the parts of the island where the birds live are different. The Leiden specimen measured:—Total length 13·5 inches, culmen 0·95, wing 6·7, tail 8·0, tarsus 1·55. It appeared also to me to be of a paler and much more delicate bluish grey above.

3. Sericosomus cursor.

Coua cursor, Grand. Rev. et Mag. de Zool. 1867, p. 86 (descr. orig.) et p. 391; Gray, Hand-l. ii. p. 208 (1867).

Upper parts of a greenish ash-colour; throat ochraceous; breast lilac; abdomen whitish; under tail-coverts greyish; lateral tail-feathers white at their extremity; tarsi iron-grey; bare skin round the eye blue, inclining to violet at the external angle (*Grandidier*).

Hab. South coast of Madagascar; Cap Sainte-Marie and Machikora (*Grandidier*).

I have never seen this species, the affinities of which were not indicated by the original describer. It is possible therefore that I have not placed it correctly in the synopsis.

4. Sericosomus gigas.

Coucou verdâtre de Madagascar, Montb. Pl. Enl. vi. pl. 815 (1783).

Cuculus gigas, Bodd. Tabl. d. Pl. Enl. p. 50 (1783).

Cuculus madagascariensis, Gm. S. N. i. p. 416 (1788).

Coccyzus virescens, Bonn. et Vieill. Enc. Méth. iii. p. 1349 (1823).

Coccyzus madagascariensis, Temm. Tabl. Méth. p. 63 (1836).

Coua gigas, Gray, Gen. B. ii. p. 454 (1846); id. Hand-l. B. ii. p. 208 (1870).

Coua madagascariensis, Bp. Consp. i. p. 109 (1850); Hartl. Faun. Madag. p. 62 (1861); Grand. Rev. et Mag. de Zool. 1867, p. 392.

Sericosomus gigas, Cab. & Heine, Mus. Hein. Th. iv. p. 72, note (1862).

Adult male. Above olive-brown, a little paler on the hind neck, the secondaries uniform with the back; primaries dark brown, externally shaded with ashy; tail-feathers blackish, washed with metallic green near the base, and broadly tipped with white, the two centre feathers not brownish at base, washed with olive-green, shading into blackish towards the tip, which is not white; sides of face and eyebrow black; throat and cheeks buffy white; chest dull ochraceous; breast clear rufous; abdomen, thighs, and under tail-coverts blackish; "orbital space indigo-blue, except at the lower part of the exterior angle, which is violet rose-colour; tarsi black; iris red" (*Grandidier*).

Total length 21 inches, culmen 1·4, wing 8·6, tail 12·3, tarsus 2·45.

Hab. Moroundara, S.W. Madagascar (*Grandidier*).

5. Sericosomus coquerelli.

Coua coquerelli, Grand. Rev. et Mag. de Zool. 1867, p. 86 (descr. orig.) et p. 391; Gray, Hand-l. ii. p. 208 (1870).

Adult male. Above olive brown, slightly inclining to greenish, the secondaries of the same colour as the rest of the back; primaries brown, externally shaded with ashy white; tail black, slightly glossed with greenish, broadly tipped with white, the two centre feathers olive-green like the back, but more metallic; above and below the eye a line of black feathers; chin fulvous white; throat and sides of neck dull ochraceous; fore neck and chest clear rufous; breast lilac; abdomen, lower flanks, and under tail-coverts dusky brown, shaded with lilac; "orbital skin clear blue, with a shade of violet rose-colour at the external corner; tarsi black; iris red" (*Grandidier*).

Total length 15·5 inches, culmen 0·9, wing 5·9, tail 9, tarsus 1·75.

Adult female. Similar to the male, but not so brightly coloured, especially on the under surface, where the rufous on the breast is much less developed.

Hab. Mouroundara, S.W. Madagascar (*Grandidier*).

6. Sericosomus ruficeps.

Coua ruficeps, Gray & Mitch. Gen. B. ii. p. 454, pl. cxv (1846); Hartl. Faun. Madag. p. 61 (1861); Grand. Rev. et Mag. de Zool. 1867, p. 391; Gray, Hand-l. B. ii. p. 208 (1870).

Sericosomus ruficeps, Cab. & Heine, Mus. Hein. Th. iv. p. 73, note (1862).

Adult female. Above olive-brown, tinged with metallic green, especially on the secondaries; the primaries dull greenish above, ashy below; hind part of neck slightly inclining to greyish; upper tail-coverts and two centre tail-feathers dull lilac-brown, the latter very slightly shaded with olive-green, rest of tail-feathers purplish blue, tipped with white, the outermost more broadly; crown of head dull

rufous; ear-coverts black; throat and cheeks whitish, the latter washed with ochre; fore neck and chest dull lilac, shading into deep ochre on the lower breast and flanks; centre of the abdomen white; under tail-coverts dull rufous; "orbital skin indigo-blue; tarsi black; iris brown" (*Grandidier*).

Total length 16 inches, culmen 0·9, wing 6·5, tail 9·5, tarsus 2·1.

M. Grandidier says that the female differs from the male by the absence of bright rufous on the head, which is only a little more pronounced than the rest of the plumage (*vide* next species).

Hab. South-western Madagascar.

7. Sericosomus olivaceiceps, sp. n.

Similar to *S. ruficeps*, but distinguished by its olive-brown head, which is uniform with the back.

Total length 18 inches, culmen 1·1, wing 6·5, tail 9·7, tarsus 2·2.

Hab. S.W. Madagascar.

M. Grandidier has kindly sent me a specimen of this bird, which he considers to be the hen of *S. ruficeps*. No other example of a difference in sex in this genus is known; and in addition to that circumstance I have sexed specimens of *C. ruficeps* now before me, collected by Van Dam, showing that the sexes are alike.

8. Sericosomus serrianus.

Coua serriana, Pucher. Mag. de Zool. 1845, Ois. p. 3, pl. 55; Gray, Gen. B. ii. p. 454 (1846); Bp. Consp. i. p. 109 (1850); Hartl. Faun. Madag. p. 61 (1861); Grand. Rev. et Mag. de Zool. 1867, p. 390; Gray, Handl. B. ii. p. 208 (1870).

Coua serresiana, Bp. Consp. Vol. Zyg. p. 5 (1854).

Sericosomus serrianus, Cab. & Heine, Mus. Hein. Th. iv. p. 74, note (1862).

Cua serriana, Schl. Mus. P. B. *Cuculi*, p. 46 (1864).

Adult. Above olive-brown, the crown and hind neck dark rufous-brown, the lower back, rump, and upper tail-coverts inclining to olive-green; lesser wing-coverts brownish, like the upper back, the greater ones and the inner secondaries olive-green, the primaries purplish black, the outer secondaries externally olive-green; tail entirely purplish black; eyebrow, sides of face, and throat black, with an indistinct circlet of olivaceous brown on the lower throat; entire breast lively chestnut; rest of under surface dull olive-green, becoming blackish on the under tail-coverts; under wing-coverts dull olive-green; "orbital skin very clear blue above the eye, ultramarine below; tarsi iron-grey; iris red" (*Grandidier*).

According to M. Grandidier, the young differs from the adult in having the coverts and quills bordered with rufous maroon, and in the rufous of the abdomen extending to the under tail-coverts.

Hab. North-western Madagascar.

Described from a specimen in the Leiden Museum.

9. Sericosomus reynaudi.

Coua reynaudi, Pucher. Mag. de Zool. 1845, p. 5, pl. 56; Bp.

Consp. i. p. 109 (1850); Hartl. Faun. Madag. p. 60 (1861); Schl. P. Z. S. 1866, p. 424; Grand. Rev. et Mag. de Zool. 1867, p. 390; Schl. & Pollen, F. M. Ois. p. 56 (1868); Gray, Hand-l. B. ii. p. 208 (1870).

Coua reyaudi, Gray, Gen. B. ii. p. 454 (1846, *lapsu*).

Sericosomus reynaudi, Cab. & Heine, Mus. Hein. Th. iv. p. 73 (1862).

Adult. Above metallic green, duller on the hind neck and interscapular region, more bronzy on the wings and lower back; quills purplish blue, the secondaries externally greenish, and the innermost bronzy green; middle tail-feathers bronzy green, the outer ones deep bluish, those nearest the centre of the tail more washed with green externally; crown bright tawny, forming a cap; sides of face blackish; ear-coverts slightly washed with green; lower surface of the body cindery grey, with a slight greenish tinge in certain lights; sides of body and under wing-coverts dull metallic green; "tarsi greyish; orbital space pure indigo-blue near the beak and above the eye, underneath and at the external angle bluish white; iris dark brown" (*Grandidier*).

Total length 15 inches, culmen 1·1, wing 5·6, tail 8·5, tarsus 1·7.

Young. Of a greenish rufous, with metallic reflexions; all the wing-feathers, except the primaries, broadly bordered with rufous maroon; lower parts of a greyish black, more or less strongly washed with rufous according to age (*Grandidier*).

Hab. North-east and north-west of Madagascar.

The description is taken from a specimen in the Leiden Museum.

10. Sericosomus cæruleus.

Le Coucou bleu de Madagascar, Briss. Orn. iv. p. 156, pl. xiii. fig. 1 (1760); Montb. Pl. Enl. vi. pl. 295 (1783).

Cuculus cæruleus, Linn. S. N. i. p. 171 (1766).

Le Coucou tait-sou, Levaill. Ois. d'Afr. v. p. 69, pl. 218 (1806); Sundev. Crit. om Levaill. p. 48 (1858).

Polophilus cæruleus, Steph. Gen. Zool. ix. p. 56 (1815).

Coccyzus cæruleus, Bonn. & Vieill. Enc. Méth. iii. p. 1348 (1823); Vieill. & Oud. Gal. Ois. i. p. 31, pl. 41 (1825); Less. Traité, p. 139 (1831).

Coua cærulea, Gray, Gen. B. ii. p. 454 (1846); Bp. Consp. i. p. 109 (1850); Hartl. Faun. Madag. p. 60 (1861); Roch & E. Newt. Ibis, 1863, p. 167; E. Newt. *l. c.* p. 453; Scl. P. Z. S. 1863, p. 164; A. Newt. P. Z. S. 1865, p. 834; Schl. P. Z. S. 1866, p. 424; Grand. Rev. et Mag. de Zool. 1867, p. 390; Schl. & Poll. Faun. Madag. Ois. p. 55 (1868); Gray, Hand-l. B. ii. p. 208 (1870).

Glaucococcyx cæruleus, Cab. & Heine, Mus. Hein. Th. iv. p. 71 (1862).

Cua cærulea, Schl. Mus. P.-B., *Cuculi*, p. 46 (1864).

Adult. Head, which is crested, and body above and below dull bluish, more dusky on the lower back, abdomen, and under tail-coverts; quills, upper tail-coverts, and tail greenish blue, shaded with purple and violet; "orbital skin ultramarine blue; tarsi black; iris brown" (*Grandidier*).

Total length 17·5 inches, culmen 0·95, wing 7·8, tail 10·9, tarsus 2·0.
Hab. Northern and north-western Madagascar.

Genus 5. Cochlothraustes.

(*Vide suprà*, p. 609.)

Cochlothraustes delalandei.

Coccygus delalandei, Temm. Pl. Col. iii. pl. 440 (1827).
Coccyzus delalandei, Less. Traité, p. 138 (1831).
Coua delalandei, Gray, Gen. B. ii. p. 454 (1846); Bp. Consp. i. p. 109 (1850); Hartl. Faun. Madag. p. 62 (1861); Gray, Hand-l. ii. p. 208 (1870).
Cochlothraustes delalandei, Cab. & Heine, Mus. Hein. Th. iv. p. 74, note (1862).
Cua delalandei, Schl. Mus. P.-B., *Cuculi*, p. 46 (1864).
Serisomus delalandii, Bp. Consp. Vol. Zyg. p. 5 (1854).

Adult. Above black, shaded with purplish blue and violet reflexions, the lower back dusky black; quills black, shaded with violet and purplish blue, in the form of cross bands; tail black, the outer feathers broadly tipped with white, the centre feathers shiny violet and deep blue, the outer ones with a greenish gloss; under surface of body yellowish white, the flanks, thighs, and under wing- and tail-coverts orange-rufous.
Total length 21 inches, culmen 2·0, wing 8·8, tail 10·8, tarsus 3·0.
Hab. Western Madagascar (*Grandidier*).

Genus 6. Centropus.

(*Vide suprà*, p. 609.)

Key to the Species.

a. Abdomen whitish or buffy white.
  a'. Throat white or buffy white.
    a''. With no perceptible superciliary streak.
      a'''. Head greenish black ..... 1. *senegalensis*.
      b'''. Head purplish blue ..... 2. *monachus*.
    b''. With a broad white eyebrow ..... 3. *superciliosus*.
  b'. Throat black ..... 4. *francisei*.
b. Abdomen chestnut; throat black ..... 5. *epomidis*.
c. Abdomen black.
  c'. Wing-coverts barred with black.
    c''. Centre tail-feathers barred with fulvous ..... 6. *nigrorufus*.
    d''. Centre tail-feathers black ..... 7. *grilli*.
  d'. Wing-coverts rufous, not barred ..... 8. *toulou*.

1. Centropus senegalensis.

Le Coucou du Sénégal, Briss. Orn. iv. p. 120, pl. viii. fig. 1 (1760); Montb. Pl. Enl. vi. pl. 332 (1783).
Cuculus senegalensis, Linn. S. N. i. p. 169 (1766); Walden, Ibis, 1869, p. 335.
Le Houkou d'Egypte, Buff. H. N. Ois. vi. p. 367 (1779).
Le Rufalbin, Buff. *l. c.* p. 370 (1779).
Egyptian Cuckow, Lath. Gen. Syn. i. pt. 2, p. 420 (1782).

Straight-heeled Cuckow, Lath. *l. c.* p. 525 (1782).

Cuculus ægyptius, Gm. S. N. i. p. 420 (1788, ex Lath.); Walden, Ibis, 1869, p. 337.

Le Coucal houhou mâle, Levaill. Ois. d'Afr. v. p. 72, pl. 219 (1806); Sundev. Crit. om Levaill. p. 48 (1858).

Centropus ægyptius, Audouin, Expl. somm. Pl. d'Ois. Savign. p. 334, pl. iv. fig. 1 (1810); Cab. & Heine, Mus. Hein. Th. iv. p. 104 (1862, pt.); Gray, Hand-l. B. ii. p. 212 (1870); Shelley, Ibis, 1871, p. 50; id. B. of Egypt, p. 164, pl. vi. (1872).

Polophilus ægyptius, Steph. Gen. Zool. ix. pt. 1, p. 54 (1815).

Centropus senegalensis, Kuhl & Swind., Buff. & Daub., Fig. Av. Nom. syst. p. 6, no. 332 (1820); Less. Traité, p. 137 (1831); Rüpp. N. W. Vög. p. 55 (1835–40); Sw. B. W. Afr. ii. p. 185, pl. xx (1857); Gray, Gen. B. ii. p. 455 (1846); Bp. Consp. i. p. 106 (1850); Scl. Contr. Orn. 1852, p. 126; Hartl. Orn. W. Afr. p. 187 (1857); Taylor, Ibis, 1859, p. 49; Gurney, *l. c.* p. 153; Cab. & Heine, Mus. Hein. Th. iv. p. 105 (1862); Kirk, Ibis, 1864, p. 326; Sperling, Ibis, 1868, p. 290; Sharpe, Ibis, 1869, p. 193; Gray, Handl. B. ii. p. 212 (1870); Heugl. Orn. N. O. Afr. p. 796 (1870); Finsch & Hartl. Vög. Ostafr. p. 526 (1870); Ayres, Ibis, 1871, p. 261; Sharpe, Cat. Afr. B. p. 14 (1871); Gurney, in Anderss. B. Dam. Ld. p. 224 (1872); Shelley & Buckley, Ibis, 1872, p. 286.

Corydonix pyrrholeucus, Vieill. & Oud. Gal. Ois. i. pt. 2, p. 41 (1825).

Corydonix senegalensis, iid. ut suprà, pl. xlvi. (1825).

Centropus burchelli, Sw. An. in Menag. p. 321 (c. 1837); Gray, Gen. B. ii. p. 455 (1846); Cab. & Heine, Mus. Hein. Th. ii. p. 105 (1862); Sundev. Crit. om Levaill. p. 48 (1858); Layard, B. S. Afr. p. 246 (1867); Gray, Hand-l. B. ii. p. 213 (1870).

Centropus houhou, Dubois, Orn. Gal. p. 17, pl. 12 (1839).

Centropus capensis, Verr. in Bp. Consp. Vol. Zyg. p. 5 (1854).

Centropus monachus (pt.), Schl. Mus. P.-B., *Cuculi*, p. 72 (1864).

Head dull black, with a greenish tinge when viewed from the light, the shafts glossy black; interscapulary region, scapulars, and wing-coverts dull brownish rufous, the shafts glossy chestnut, greater coverts and quills bright rufous, with dusky tips, the inner secondaries dull-brownish rufous with an olivaceous gloss; lower back and rump dusky, minutely barred with dull ochre; upper tail-coverts and tail dull greenish, inclining to oily green, the former generally with obsolete bars of ochre; feathers under the eye and ear-coverts black, like the head; entire sides of face and neck, as well as the under surface of body, more or less deep ochre inclining to white on the centre of abdomen, the shafts glossy fulvous, especially distinct on the throat and sides of neck, the flanks with remains of dusky cross bars; under wing-coverts pale buff, inner surface of wing dull rufous; bill and feet black.

Young. More dingy above and paler below than the adult; head dull brownish; upper surface barred across with dusky black, with remains of dusky bars on the sides of the breast and flanks; upper tail-coverts and tail barred more or less distinctly with pale ochre; beak horn-brown, the lower mandible yellowish.

Hab. N. E. Africa: delta of Nile southwards to Cairo and the Fayoom (*Shelley, Von Heuglin*); Soudan (*Knoblecker*). E. Africa: Zanzibar (*Kirk, Von der Decken*); Mosambique (*Sperling*). S. Africa: Zambesi (*Kirk*); Transvaal (*Ayres*); Graham's Town (*Atmore*). W. Africa: Cape Lopez (*Verreaux, Mus. R. B. S.*); Ibadan (*Hinderer*); Accra (*Haynes*); Fantee (*Ussher*); Cape Palmas (*Fraser*); Grand Bassam (*Thomson*); Casamanze (*Verreaux*); river Gambia (*Laglaize, Mus. Brit.*).

Very great differences are to be observed in specimens of *Centropus senegalensis*, even from the same locality. Thus some are dull olive-brown on the back and wing-coverts, against which the rufous wings stand out in clearer relief. All Egyptian specimens that I have seen are like this, and this would seem to indicate a specific distinction for *C. ægyptius*; but this I cannot at present allow, for I have exactly similar specimens from the Gambia, Fantee, and Gaboon. Owing to my specimens not being sexed, I am unable to state whether this is a sexual difference or merely one of age; but I think it may very possibly be the male bird. In this group of Cuckoos the female is generally the larger and finer bird; and from what my friend Captain Marshall has told me about the Indian *Centropi*, the males are more numerous than the females, which may account, in the case of *C. senegaleusis*, for the rarity of the bright rufous birds. But it is by no means improbable that this brown plumage is a seasonal dress, as I have one or two specimens which seem to be intermediate between the two forms. As to *C. Burchelli*, I believe I am right in uniting it to *C. senegalensis*, as I did in my catalogue, as I can see no difference between South-African and Fantee examples. I subjoin the measurements of a series, which will show that size is no specific character.

No.	Locality.	Authority.	Long. tot.	Alæ.
1.	River Gambia.	Mus. R. B. S.	14·2	6·5
2.	Accra.	G. E. Shelley.	13·8	6·3
3.	,,	Capt. Haynes.	14·5	6·3
4.	,,	J. Smith.	13·5	6·4
5.	,,	,,	15·0	6·4
6.	,,	G. E. Shelley.	13·7	6·3
7.	Fantee.	,,	13·5	6·2
8.	,,	Mus. R. B. S.	15·1	6·4
9.	Sudan.	Knoblecker.	16·0	6·8
10.	Graham's Town.	T. C. Atmore.	14·0	6·3
11.	Transvaal.	T. Ayres.	14·8	6·7
12.	River Gambia.	L. Laglaize.	14·7	6·45
13.	,,	,,	16·0	6·8
14.	Accra.	G. E. Shelley.	14·8	6·45
15.	Fantee.	H. T. Ussher.	14·8	6·5
16.	Cape Lopez.	Verreaux.	16·0	6·9
17.	Egypt.	Mus. G. E. Shelley.	16·5	7·0
18.	,,	,,	16·5	7·1
19.	,,	,,	16·0	7·1

Of the above nineteen specimens, the first eleven are either in full or partial rufous dress; the others are in the brown phase. The larger size of the latter, especially the Egyptian ones, is noticeable; and further information on this species is greatly to be desired.

2. Centropus monachus.

Centropus monachus, Rüpp. N. W. Vög. p. 57, Taf. 21. fig. 2 (1835); id. Syst. Uebers. p. 96 (1845); Des Murs in Lefebvre, Voy. Abyss. Zool. p. 137 (1847); Bp. Consp. i. p. 107 (1850); J. & E. Verr. Rev. et Mag. de Zool, 1855, p. 271; Heugl. Syst. Uebers. p. 48 (1856); Hartl. Orn. W. Afr. p. 187 (1857); Cass. Proc. Phil. Acad. 1859, p. 142; Antin. Cat. descr. Ucc. p. 85 (1865); Bocage, Jorn. Lisb. ii. p. 348 (1869); Finsch, Tr. Z. S. vii. p. 284 (1870); id. et Hartl. Vög. Ostafr. p. 528 (1870); Blanf. Geol. & Zool. Abyss. p. 314 (1870); Heugl. Orn. N. O. Afr. p. 793 (1870); (Gray, Hand-l. B. ii. p. 213 (1870); Sharpe, Ibis, 1872, p. 68.

Adult. Entire head and neck black, with a brilliant purplish-blue gloss, the shafts glossy black; centre of the back and entire wings bright chestnut, the tips of the primaries and the inner secondaries olive-brown; rump dusky black, glossed with purplish blue; upper tail-coverts greenish; tail brown with a dull greenish gloss; undersurface of the body yellowish white, the flanks and abdomen inclining to ochre, the shafts rather distinct, especially on the throat; under wing-coverts buff, the lower ones chestnut, like the inner face of the wing; bill and feet black; iris red. Total length 15·4 inches, culmen 1·25, wing 7·2, tail 9·3, tarsus 1·9.

Hab. N. E. Africa: Resident in Abyssinia to 9000 feet, very common on the Bahr-el-Abiad, found on the Atbara and tributaries, rare on the Blue Nile, Dender, and Rahad (*Von Heuglin*); Agula (*Blanford*). E. Africa: Mosambique (*Mus. Brit.*). S. W. Africa: Caconda (*Anchieta*). W. Africa: Camma river (*Du Chaillu*); Agnapim (*Ries*); Accra (*Haynes*); Fantee (*Ussher*).

3. Centropus superciliosus.

Centropus superciliosus, Hempr. & Ehr. Symb. Phys. fol. r (1828); Rüpp. N. W. Vög. p. 56, t. 21. fig. 1 (1835); id. Syst. Uebers. p. 96 (1845); Gray, Gen. B. ii. p. 455 (1846); Bp. Consp. i. p. 107 (1850); Bianc. Spec. Zool. Mosamb. p. 51 (1851); Heugl. Syst. Uebers. p. 48 (1856); Gurney, Ibis, 1859, p. 247; Cab. & Heine, Mus. Hein. Th. iv. p. 106 (1862); Brehm, Reis. Habesch, p. 367 (1863); Antin. Cat. descr. Ucc. p. 86 (1865); Mont. P. Z. S. 1865, p. 91; Hartl. P. Z. S. 1867, p. 826; Layard, B. S. Afr. p. 246 (1867); Cab. in Von der Decken, Reis. iii. Vög. p. 39 (1869); Bocage, Jorn. Lisb. ii. pp. 326, 337 (1869); Blanf. Geol. & Zool.

Abyss. p. 315 (1870); Heugl. Orn. N. O. Afr. p. 797 (1870); Gray, Hand-l. B. ii. p. 213 (1870); Sharpe, P. Z. S. 1870, pp. 145, 149; id. Cat. Afr. B. p. 14 (1871).

Centropus superciliaris, Bocage, Jorn. Lisb. ii. p. 349 (1869, *lapsu*).

Adult. Head and hind neck blackish or brownish black, the feathers under the eye and ear-coverts also black; over the eye a broad stripe of yellowish white; all the feathers of the hind head and neck distinctly streaked down the centre with yellowish white; centre of back and scapulars dull rufous brown, all the feathers mesially streaked with whitish, these stripes being further bordered with blackish on each side, causing them to stand out in bolder relief; wings dull rufous above and below, the quills tipped with dusky, the inner secondaries inclining to olive-brown, the least wing-coverts streaked with whitish, like the scapulars; lower back dusky black, transversely barred with dull ochre; upper tail-coverts and tail greenish black, with somewhat of an oily-green gloss, the latter narrowly tipped with white, the upper tail-coverts barred with dull ochre; undersurface of body yellowish white, the feathers of the sides of the neck whitish in the centre, this streak margined on each side with black, giving a very distinctly striped appearance, the shafts of the breast-feathers whitish, but without the black lines on them; sides of the body, flanks, and under tail-coverts narrowly barred with blackish; under wing-coverts pale rufous, with obsolete streaks as on the sides of the neck; beak black; feet bluish slate-colour; iris bright crimson. Total length 16·3 inches, culmen 1·35, wing 6·25, tail 8·3, tarsus 1·55.

Young. Above dull rufous brown, barred with blackish; lower back and rump black, barred with pale fulvous, more narrowly on the upper tail-coverts; head and hind neck streaked along the shaft with straw-colour or pale rufous; superciliary streak and sides of face fulvous, the latter slightly washed with rufous, the shafts whitish; undersurface of body fulvous, the breast and sides of neck marked with rufous, with whitish shaft-stripes; quills rufous, the primaries not barred for their basal half, the secondaries barred all the way; tail dull greenish, with fulvous bars towards the tip and on the external feathers; iris light brown.

Hab. N. E. Africa: Resident, inhabits S. Arabia and Abyssinia coast country to the Anseba valley, found on the Tacazi and Blue Nile, from Southern Nubia northwards to the province of Dongola and in Kordofan (*Von Heuglin*); Ailat, Ain, the Lebka, and Anseba valleys, never seen in Abyssinia Proper (*Blanford*). E. Africa: Zanzibar (*Kirk*). S. Africa: Swellendam (*Layard*); Natal (*Ayres*). S. W. Africa: Rio Coroca, Ambaca (*Anchieta*). W. Africa: Angola (*Monteiro*); Rio Dande and Katenbella (*Sala*).

4. Centropus francisci.

Centropus francisci, Bp. Consp. i. p. 107 (1850, descr. orig.);

Hartl. Orn. W. Afr. p. 186 (1857); Cab. & Heine, Mus. Hein. Th. iv. p. 107 (1862); Schl. Mus. P.-B., *Cuculi*, p. 71 (1864); Sharpe, Ibis, 1869, p. 193; Gray, Hand-l. B. ii. p. 213 (1870); Sharpe, Cat. Afr. B. p. 13 (1871).

Head and neck all round, extending above to the interscapulary region, and below to the fore neck and a little way down the sides of the breast, purplish blue, duller on the head, and brightest on the hind neck; the shafts glossy black; middle of back, scapulars, and entire wings above and below deep chestnut, the quills dusky at tip; on the middle of the back a few indistinct blackish cross bars; rump, upper tail-coverts, and tail dull greenish black, the latter with a very faint purplish gloss near the tip, the former very narrowly barred with pale ochre, these bars sometimes extending on to the base of the tail-feathers; breast and abdomen white, the sides of the body chestnut under the wings, the flanks deep ochre; bill and feet black. Total length 22·5 inches, culmen 1·8; wing 8·0, tail 12·0, tarsus 2·1.

Hab. Fantee (*Ussher*); Rio Boutry (*Pel*), Gaboon? (*Du Chaillu*).

Mr. Cassin identifies some specimens from the Camma as belonging to this species; but they were not in mature plumage, and he was not quite certain of the correctness of his determination.

One of my specimens is barred with black on the wing-coverts and inner secondaries, and has ochre bars on the base of the tail, extending a good way up the lateral tail-feathers. Another one has traces of bars on the flanks. This barred plumage seems to be the remains of immaturity or, more probably, of change of plumage. There is great difference in the size of specimens, the smallest measuring 19·5 inches in length, the largest 22·5 inches; the small bird is probably the male.

5. Centropus epomidis.

Centropus epomidis, Temm. in Bp. Consp. i. p. 107 (1850); Hartl. Orn. W. Afr. p. 187 (1857); Cab. & Heine, Mus. Hein. Th. iv. p. 107 (1862); Schl. Mus. P.-B., *Cuculi*, p. 71 (1864); Gray, Hand-l. B. ii. p. 213 (1870).

Adult. Head and neck all round, extending above to the interscapulary region, and below to the upper breast, dusky black, with glossy black shafts; back and wings deep chestnut, the primaries tipped and the secondaries washed with dusky brown; rump, upper tail-coverts, and tail dusky blackish brown; breast chestnut; the lower abdomen and under tail-coverts dusky black; under wing-coverts and inner face of wings deep chestnut; bill and feet black. Total length 15 inches, culmen 1·3, wing 6·4, tail 8·2, tarsus 1·55.

Hab. Denkera, interior of Fantee (*Ussher*, *Mus. R. B. S.*); Ashantee (*Pel*).

6. Centropus nigrorufus.

Le Coucal noirou mâle, Levaill. Ois. d'Afr. v. p. 78, pl. 220 (1806); Sundev. Crit. om Levaill. p. 48 (1858).

Cuculus nigrorufus, Cuv. Règne An. i. p. 426 (1817).

Corydonix bicolor, Vieill. N. Dict. xxxiv. p. 297 (1819).

Centropus nigrorufus, Steph. Gen. Zool. xiv. p. 213 (1826); Less. Traité, p. 135 (1831); Gray, Gen. B. ii. p. 455 (1846); Bp. Consp. i. p. 107 (1850); Cab. & Heine, Mus. Hein. Th. iv. p. 107, note (1862); Layard, B. S. Afr. p. 245 (1867); Gray, Hand-l. B. ii. p. 213 (1870).

Female. Head and neck all round, fore neck and chest deep black, the shafts to the feathers glossy black; rest of underparts also black, but the black shafts not so distinct; interscapulary region deep chestnut, with rufous shafts to the feathers; wing-coverts paler rufous, crossed with narrow blackish bars and very distinct fulvous shaft-stripes to the feathers, these characters being more decided on the lesser and greater coverts, nearly obsolete on the median ones; quills pale rufous, with dusky tips and rufous shafts, the inner secondaries crossed with alternate broad bars of black and rufous or fulvous, with distinct fulvous shafts; middle of the back pale rufous, minutely barred with black; lower back, rump, and upper tail-coverts glossy black; tail black, the middle feathers barred with fulvous brown; under wing-coverts and entire under surface of wing rufous; bill and feet black. Total length 13 inches, culmen 1·1, wing 7·0, tail 7·7, tarsus 1·55.

Hab. S. Africa; Port Natal (*Wahlberg*).

The above description is taken from a bird in my collection, received by me in exchange from the Stockholm Museum, and obtained by the late Professor Wahlberg, near Port Natal, on the 28th of November, 1840. I have not as yet seen another specimen; and it seems to me as if this bird were in partial change, to judge by analogous examples of other black-and-red *Centropi*. The bars on the tail, which I have made of specific importance, to distinguish it from its African allies, as well as those on the wing-coverts and inner secondaries, may after all be only a token of winter or young plumage.

7. Centropus grilli.

Centropus grillii, Hartl. J. f. O. 1861, p. 13; Cab. & Heine, Mus. Hein. Th. iv. p. 107 (1862); Gray, Hand-l. B. ii. p. 213 (1870).

Head, neck, interscapulary region, lower part of the back, tail, and entire underparts black; lesser wing-coverts pale rufous, rather broadly banded with black; the shafts pale buffy white; primaries and secondaries bright cinnamon-rufous, dusky at the tip, the shafts rufous; tertiaries dusky, with brown shafts; centre of the back obscure dusky; whole of the inner aspect of the wing pale rufous; bill and feet black. Total length about 11 inches, culmen 11‴, wing 5·9, tail from base 6½, tarsus 1°4‴ (*Hartlaub*).

Hab. Gaboon.

I have reproduced Dr. Hartlaub's description, never having seen this bird myself. It is evidently very close to *C. nigro-rufus*, and may yet prove identical. Comparing my specimen of the latter with the original description of *C. grillii*, the only differences exhibited are the absence of all bars on the greater wing-coverts, inner secondaries, and central tail-feathers in *C. grillii*.

8. Centropus toulou.

Le Coucou de Madagascar, Briss. Orn. iv. p. 138, pl. xiii. fig. 2, 1760.

Cuculus toulou, Müll. Syst. Nat. Suppl. p. 90 (1776).

Long-heeled Cuckow, Lath. Gen. Syn. i. pt. 2, p. 524 (1762).

Coucou de Madagascar appelé Toulou, Montb. Pl. Enl. vi. pl. 295 (1783).

Cuculus melanorhynchus, Bodd. Tabl. Pl. Enl. p. 18 (1783).

Cuculus tolu, Gm. S. N. i. p. 422 (1788, ex Montb.).

Polophilus toulu, Steph. Gen. Zool. ix. p. 52 (1815).

Corydonix tolu, Vieill. N. Dict. xxxiv. p. 295 (1819).

Centropus tolu, Kuhl & Swind., Buff. & Daub. Fig. Av. Nom. syst. p. 6, no. 295 (1820); Less. Traité, p. 136 (1831): Bp. Consp. i. p. 167 (1850); Hartl. Faun. Madag. p. 60 (1861); Roch & E. Newt. Ibis, 1863, p. 166; E. Newt. *l. c.* p. 452; Scl. P. Z. S. 1863, p. 164; A. Newt. P. Z. S. 1864, p. 824.

Centropus affinis, Less. Traité, p. 136 (1831).

Centropus melanorhynchus, Gray, Gen. B. ii. p. 455 (1846).

Centropus superciliosus, Hartlaub, Faun. Mad. p. 60 (1861).

Corydonyx melanorhynchus, Cab. & Heine, Mus. Heine, Th. iv. p. 108 (1862).

Centropus toulou, Cass. Pr. Phil. Acad. (1864), p. 243; Gray, Gen. B. ii. p. 214 (1870).

Centropus madagascariensis, Schl. Mus. P.-B., *Cuculi*, p. 65 (1864); id. P. Z. S. 1866, p. 424; id. & Poll. Faun. Madag. Ois. p. 57 (1868).

Centropus lafresnayanus, J. Verr. N. Arch. Mus. ii. Bull. p. 25, pl. 2 (1866); Gray, Hand-l. B. ii. p. 214 (1870).

Adult male. Above and below black, with a bluish green gloss, the shafts stiff and glossy black; upper tail-coverts more decidedly glossed with greenish; tail black, with an oily green gloss; wings brilliant chestnut, tips of primaries and the inner secondaries shining olive-brown; bill black; feet greyish; iris red. Total length 16 inches, culmen 1·15, wing 5·9, tail 9·7, tarsus 1·55.

Adult female. Similar to the male, but larger. Total length 16·5 inches, culmen 1·5, wing 6·5, tail 10·3, tarsus 1·6.

Hab. Madagascar.

8. On three new Species of Birds. By R. B. Sharpe, F.L.S., F.Z.S., Senior Assistant, Zoological Department, British Museum.

[Received June 13, 1873.]

Chamætylas princei, sp. n.

Olive-brown on head and hind neck, gradually shading off into rufous brown on the rest of the back and tail, the latter slightly tipped with white on the two outermost feathers; wing-coverts a little more golden brown than the back, with large white triangular spots at the tips of the greater and median series; quills blackish brown, shaded externally with golden brown, the secondaries more broadly; lores, sides of face, and feathers round the eye white, with a line of black drawn across the side face, and another behind the ear; a narrow indication of moustachial feathers; chin, centre of the body, flanks, and under tail-coverts white; throat, chest, and sides of body ochreous brown, the latter washed with olive; small under wing-coverts white, with broad black tips, the greater ones black at base, white at tip; primaries white at base of inner web; bill horn-black, yellowish at base of lower mandible; feet yellowish. Total length 8·5 inches, culmen 0·8, wing 4·1, tail 3·1, tarsus 1·25.

Hab. Denkera, in the interior of Fantee.

The type is in the British Museum. It seems of the same form as *Geocichla compsonota*, Cassin (Pr. Phil. Acad. 1859, p. 42), which Heine has made the type of his genus *Chamætylas*. This is conjectural, as no specimen of *C. compsonota* is on this side of the Atlantic, so far as I know. Cassin, however, describes his bird as a *Geocichla* with a thick bill, which answers to my specimen. The colours, however, are totally different.

This new species is dedicated to my old and valued friend Mr. Edwin C. Prince, for more than forty years the faithful coadjutor of Mr. John Gould.

Baza erythrothorax, sp. n.

Baza magnirostris (nec Gray), Wall. P. Z. S. 1862, p. 337; Schl. Vog. Nederl. Ind., Valkv. pp. 40, 75, pl. 25. figs. 4, 5 (1866); Wall. Ibis, 1868, p. 18; Walden, Tr. Z. S. viii. p. 36 (1872).

Hab. Celebes.

This species differs from the trne *B. magnirostris* of the Philippines in its much larger size, dark brown colour, black head, and dark cinereous ear-coverts, in wanting the grey on the chest, and in the dark rufous brown of the under surface. This latter colour is especially distinct on the chest, the sides of the body and flanks having a few white cross bars.

Measurements as follows:—Total length 17·5 inches, culmen 1·25, wing 11·5, tail 8·0, tarsus 1·65.

Mr. Wallace (*l. c.*) gives the following note on the soft parts:—"Bill lead-colour, black above; feet white; iris yellow."

The types are in the British Museum, which now possesses examples of every species of *Baza*.

Macrodipteryx sperlingi, sp. n.

Very like *M. longipennis*, but much larger, and differently marked on the wings and tail. The first primary has only three large rufous bars and a subterminal spot on the inner web; and the outer tail-feather has only six broad ashy-white bars on the inner web. Total length 9·5 inches, wing 7·9, tail 5·4, tarsus 0·8.

Hab. Bay of Malimba (*R. M. Sperling*).

This new Goatsucker is strictly congeneric with *Macrodipteryx longipennis*, although, being shot out of season, it has not the long pennants. There are other differences in plumage besides those noticed; but I have chosen the most distinguishable, as long descriptions are of little assistance in this group of birds. I have named this fine species after my friend Commander Sperling, who shot the specimen at sea off the Bay of Malimba.

9. On certain Muscles of the Thigh of Birds and on their value in Classification. By A. H. Garrod, B.A., F.Z.S., Prosector to the Society. Part I.

[Received June 16, 1873.]

In their works on the general anatomy of the animal kingdom Meckel and Cuvier have devoted special chapters to the myology of birds. The dissections on which their observations were based were evidently undertaken more with the desire to determine the relations borne by the muscles of birds to those of Mammalia and Reptiles, than with the object of studying the variations in the arrangement of the muscles in the class itself. Nitzsch, Reid, Owen, Milne-Edwards, Coues, Selenka, and others have published their dissections of certain birds, as the Vulture, Penguin, Apteryx, Eagle, and Loon; and most of these are, from their accuracy and clearness, valuable additions to zoological knowledge. Sundevall seems to be the only ornithologist who has employed the variations that he has observed to be constant in different birds towards the furtherance of classification; and my results, on the points discussed by him, in most cases correspond with his.

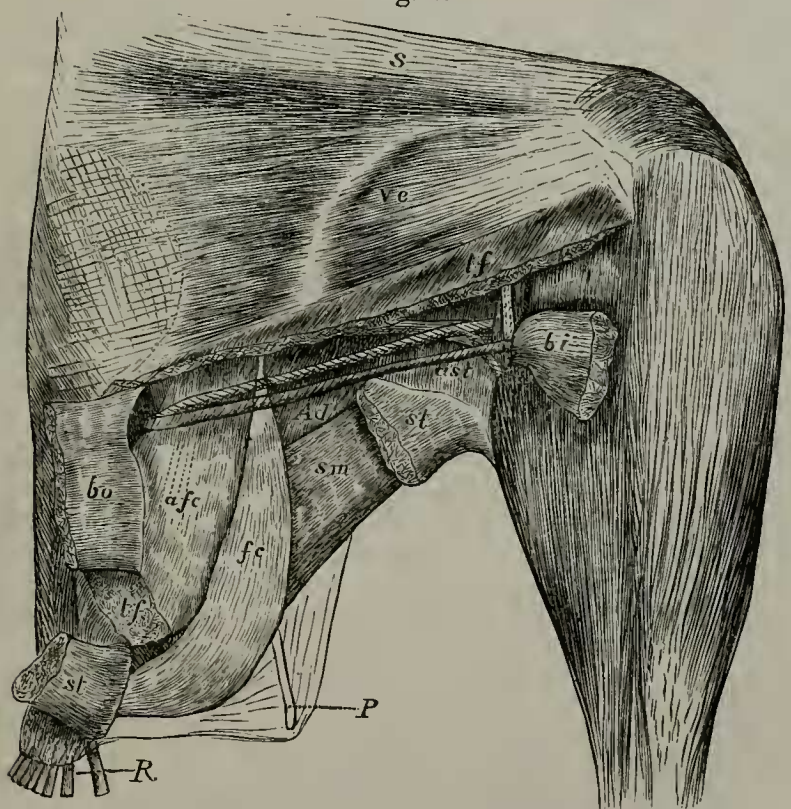
The great opportunities afforded me by this Society for the study of a great many species of birds in the flesh, have reduced the difficulties connected with the dissection of any special soft part to a minimum; and in the present communication the results are recorded of my dissection of the region of the thigh of the birds which have passed through my hands. In this region there are six muscles, or well-defined portions of muscles, which may or may not be present; and my chief object has been to note their presence or absence, which in some cases is far from easy, as modifications may occur which disguise the true connexions of a muscle, and thus lead to misinterpretation.

As a common Fowl happens to possess all these six muscles well developed and easily demonstrable, I will commence with a short

account of their condition and relations in it, from which a correct idea may be easily formed of their situation in other birds with the help of the accompanying details.

In commencing the dissection of the leg of a Fowl in order most easily to observe the arrangement of the muscles about to be described, the body, from which most of the feathers have been removed, should be laid on its side, and a section made in the skin, in a line parallel to and just over the femur, along its whole length; from the extremities of this line the sections should be continued at right angles to it, extending upwards and downwards from the end over the head of the femur, and along the outer side of the leg from that at the knee. The skin must be then dissected downwards as a flap off the muscular adductor mass below, and some way upwards above the level of the femur. After this has been done the following muscles will be found without difficulty:—

Fig. 1.



Outer view of right thigh of *Gallus bankiva*, partially dissected.

s, sartorius; *ve*, vastus externus; *bo* and *bi*, biceps, origin and insertion; *tf*, tensor fasciæ; *fc*, femoro-caudal; *afc*, accessory femoro-caudal; *st*, semitendinosus; *ast*, accessory semitendinosus; *sm*, semimembranosus; *Ad*, adductor; *P*, pubis; *R*, rectrices.

Tensor fasciæ.—This is the superficial muscle of the outside of the thigh, covering the femur. It is flat and triangular in shape, and arises as a membranous expansion which covers the gluteus ii., from the lower two thirds of the posterior border of the iliac fossa in which that muscle is situated, and from the fibrous septum which separates that muscle from the gluteus iii. Further down it has origin also from the whole length of the ridge which separates the postacetabular area from the external lateral surface of the ischium, and which may be termed the postacetabular ridge, as well as from the posterior border of the ischium, as far forwards as its junction with the pubis, being here slightly overlapped by the semitendinosus. The fibres converge towards the knee; and the deep portion of the muscle blends in its course with the vastus externus, together with which it continues forward to become part of the broad thin tendon which covers the knee and is inserted in the front of the tibia-head, the patella being situated in it, together with the long, slender, and flat tendon of the *ambiens* muscle, which is situated below it, running obliquely from inside and above, outwards and downwards. In many birds, as the Falconidæ and Psittaci, this muscle does not extend below the level of the femur, but ends inferiorly by blending with the vastus externus; and consequently, where such is the case, it evidently cannot, as it does otherwise, cover any of the flexors of the leg. In the *Bucerotidæ* it is entirely absent. Whether this postacetabular portion of the tensor fasciæ is present or absent has some bearing on classification, as in the different families it is a very constant feature.

Biceps cruris.—The anterior portion of this muscle may be seen in the Fowl's leg before the tensor fasciæ has been removed, just below it, near its insertion. This muscle is mostly covered by the tensor fasciæ, arising from the upper three fourths of the postacetabular ridge, just in front of the origin of that muscle. Its fibres converge to form a round tendon, which in the outer side of the popliteal region is bent sharply downwards by passing through a tendinous sling which arises from the lower end of the femur, to be inserted on a prominence on the outer side of the fibula, about halfway down the leg. In the loop above this tendon, and consequently quite out of the way of compressing forces, one of the nerves to the leg and foot is continued. In one or two birds, as *Phaëthon*, the biceps does not pass through any loop, but is inserted directly by a broad flat tendon into the upper part of the fibula.

Semitendinosus.—This flat ribbon muscle runs nearly parallel with the lower fibres of the biceps, just below it. Its origin is mostly from the tip of the transverse process of the first free coccygeal vertebra, and from the fibrous membrane between it and the inferior border of the ilium. Near its origin it, being superficial, curves over the posterior inferior angle of the ilium, and covers the inferior fibres of origin of the tensor fasciæ, running upwards and forwards towards the inner side of the head of the tibia, and so getting covered anteriorly by the inserted end of the biceps. A rhomboidal sheet of muscle, arising from the anterior end of the linea aspera, descends to form an accessory head to this muscle, joining it anteriorly, on its outer side, by an oblique tendinous raphe, which continues down the

back of the leg superficially. A small part of the main muscle, the inner, goes straight forward to end at the inner side of the upper extremity of the tibia by a flat tendon; but most of it joins the accessorius to be continued down the leg. Some birds, as the Eagles and Owls, have no semitendinosus at all; some, as the Anserine birds and Penguins, have no accessory simitendinosus, in which case all the fibres go straight to the tibia-head; whilst in most the above-described condition maintains.

Semimembranosus.—This ribbon muscle runs parallel to, deep of, and next to the semitendinosus. It arises from the outer border of the anterior margin of the ischium for about a third of an inch, at the place where it is in contact with the pubis, the origin extending down to the lower end of the slight prominence at the point where the ischium slightly overlaps the pubis. It is inserted along with the tibial end of the semitendinosus into the inner side of the head of the tibia by a broad flat thin tendon. This muscle is very constant in birds: in the Grebes it is extremely thin, and may sometimes be absent, as stated by Sundevall; but I have seen it in some fresh specimens of *Podiceps minor*, though but very slightly developed.

Ambiens.—This peculiar, small, but very long muscle is triangular or fusiform in shape. It arises from the tip of the short anteriorly directed spine which is situated just above the anterior border of the acetabulum, and runs along the inner side of the thigh to the inner side of the knee, where it is covered by the sartorius, which is above it in the former part of its course. Its thin tendon then crosses the knee, running in the substance of the fascial extensor tendon, just in front of the patella, to the outer side, where it joins the fibres of origin of the flexor perforatus digitorum.

Femoro-caudal.—This long ribbon muscle is covered superficially by the tensor fasciæ and biceps above, as well as by the semitendinosus lower down. The sciatic artery and nerve cross it superficially at right angles close to its insertion as they course from the sciatic foramen, parallel to the femur, to the popliteal region. The femoral vein separates this muscle from the adductor muscles at their insertions, except in *Dacelo*, where it crosses the femoro-caudal superficially*. It arises from the (anterior) transverse processes of the two last coccygeal vertebræ, and is inserted into the linea aspera of the femur, at about one third its length from the trochanter.

An accessory head, arising from the upper three fourths of the post-acetabular ridge, and from the ridge which forms the lower margin of the origin of the obturator externus, joins the tendon of insertion of this muscle, and is also partly inserted into the linea aspera, between it and the head of the femur. It is thin, muscular, and broad, covering the obturator externus superficially, and is partially intersected by a fibrous sheet where it crosses its anterior border. The sciatic artery and nerve cross it superficially; and the nerve to the semimembranosus is deep of it, whilst that to the semitendinosus is superficial in some cases; the biceps completely covers it.

Of the above-described muscles, five of them (the ambiens, the

* In *Centropus phasianus* the main artery of the leg is also the femoral, and not the sciatic, as in other birds; it therefore runs with the femoral vein in that bird.

femoro-caudal, the accessory femoro-caudal, the semitendinosus, and the accessory semitendinosus) vary; any one or more than one may be absent in different birds; and in my dissections my object has always been to record the conditions existing in the specimen under examination. The constancy of the peculiarities in the different individuals of each species, in the species of each genus, and very generally in the genera of each family, makes it evident to any one working at the subject, that much respecting the affinities of the different families of birds is to be learnt from the study of their myology, in connexion with the peculiarities of their other soft parts; and that these features will, in the long run, lead to a more correct classification than one based on the skeleton alone, becomes almost equally certain.

The variations in the five above-mentioned muscles form the subject of this communication, and the subjoined list contains the results arrived at by myself. A few of the facts now recorded will be found mentioned in the works of Meckel, Sundevall, and others. Reference to them is quite unnecessary, as they can be easily found in the works of those authors.

The *Passeres* possess the femoro-caudal, the semitendinosus, and the postacetabular portion of the tensor fasciæ; the accessory semitendinosus is present in all except *Dicrurus* (which has only ten rectrices); the ambiens and the accessory femoro-caudal are absent*.

The *Pici* possess the femoro-caudal, the semitendinosus, and the postacetabular portion of the tensor fasciæ; the ambiens and the accessory femoro-caudal are absent; and they may be divided into two subfamilies, according to whether the accessory semitendinosus is present or absent.

The accessory semitendinosus is absent in

Picus major.
—— *minor.*
Picoïdes tridactylus.

The accessory semitendinosus is present in

Gecinus viridis.
Leuconerpes candidus.
Melanerpes formicivorus.
Chloronerpes yucatanensis.
Mulleripicus fulvus.
Hypoxanthus rivolii.

Yunx torquilla agrees in all these points with *Gecinus viridis*.

The *Steatornithidæ* possess the semitendinosus, and a very narrow accessory semitendinosus. The ambiens, the femoro-caudal, the accessory femoro-caudal, and the postacetabular portion of the tensor fasciæ are absent.

Species examined.

Steatornis caripensis.

The *Caprimulgidæ* possess the femoro-caudal, the semitendinosus,

* In my paper on the carotid arteries of birds a long list is given of the Passeres in which the carotid vessels were examined; in all these the muscles of the thigh were dissected also. In a specimen of *Pomatostomus temporalis* there was an accessory femoro-caudal on the right side; on the left there was not a trace of it.

the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ; the ambiens and the accessory femoro-caudal are absent.

Species examined.

Caprimulgus europæus. *Chordeiles texensis.*

The *Trogonidæ* possess the femoro-caudal and the semitendinosus; the ambiens, the accessory femoro-caudal, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ are absent.

Species examined.

Trogon mexicanus. *Trogon puella.*

The *Meropidæ* possess the femoro-caudal, the semitendinosus, and the accessory semitendinosus; the ambiens, the accessory femoro-caudal, and the postacetabular portion of the tensor fasciæ are absent.

Species examined.

Merops apiaster. *Merops ornatus.*

The *Cypselidæ* and the *Trochilidæ* agree in possessing the femoro-caudal, at the same time that the ambiens, the accessory femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ are absent.

Species examined.

Cypseloïdes fumigatus.
Cypselus apus.
—— *alpinus.*
Dendrochelidon coronata.
Patagona gigas.
Chlorolampis osberti.
Chætura vauxi.
—— *caudacuta.*
—— *spinicauda.*

The *Coraciadæ* possess the femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ; the ambiens and the accessory femoro-caudal are absent.

Species examined.

Coracias garrula. *Eurystomus*, sp.

The *Momotidæ* possess the femoro-caudal, the semitendinosus, and the accessory semitendinosus; the ambiens, the accessory femoro-caudal, and the postacetabular portion of the tensor fasciæ are absent.

Species examined.

Momotus lessoni.
—— *æquatorialis.*
Eumomota superciliaris.

The *Galbulidæ* possess the femoro-caudal and the semitendinosus; the ambiens, the accessory femoro-caudal, and the postacetabular portion of the tensor fasciæ are absent.

In *Galbula albirostris* the accessory semitendinosus is present; but it is absent in *Urogalba paradisea*.

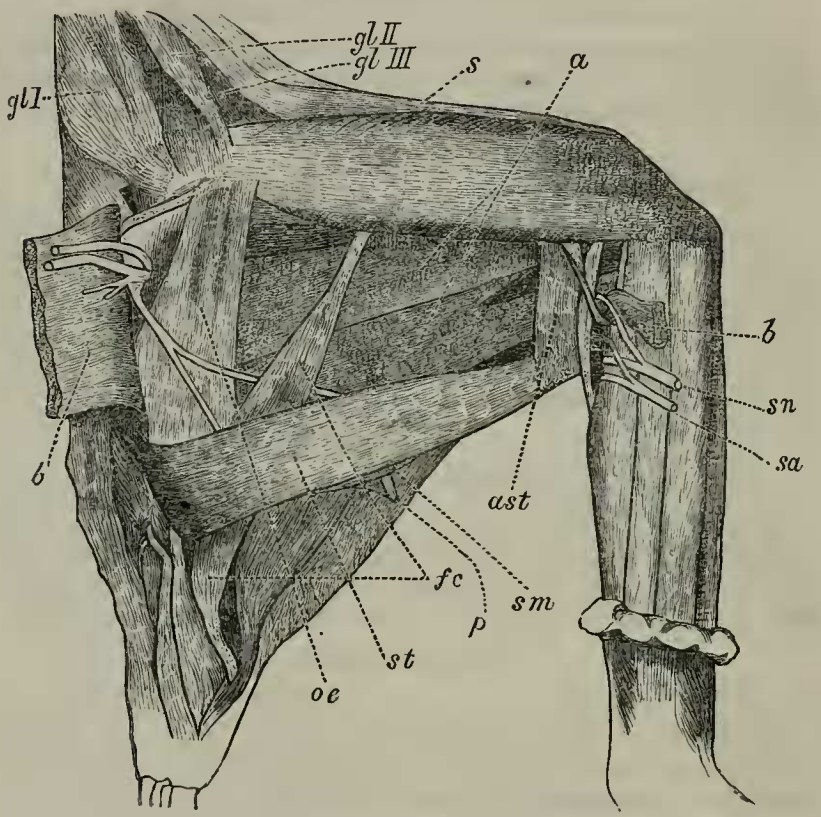
The *Alcedinidæ* possess the femoro-caudal and the semitendinosus; the ambiens, the accessory femoro-caudal, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ are absent.

Species examined.

Alcedo ispida.	*Dacelo cervina.*
Ceryle amazona.	—— *gigantea.*
Halcyon, sp.	*Cittura cyanotis.*

The *Bucerotidæ* possess the femoro-caudal, the semitendinosus, and the accessory semitendinosus; the ambiens, the accessory femoro-caudal, and the tensor fasciæ are absent.

Fig. 2.



Outer view of right thigh of *Buceros coronatus*, dissected.

b, biceps; *s t*, semitendinosus; *a s t*, accessory semitendinosus; *s m*, semimembranosus; *f c*, femoro-caudal; *o e*, obturator externus; *a*, adductors; *gl*, I, II, and III, glutei; *s*, sartorius; *s n*, sciatic nerve; *s a*, sciatic artery; *p*, pubis.

Species examined.

Buceros rhinoceros.	*Buceros coronatus.*
—— *plicatus.*	—— *atratus.*
—— *bicornis.*	*Toccus melanoleucus.*

The *Upupidæ* possess the femoro-caudal, the semitendinosus, and the accessory semitendinosus; the ambiens, the accessory femoro-caudal, and the postacetabular portion of the tensor fasciæ are absent.

Species examined.

Upupa epops.

The *Musophagidæ* possess the ambiens, the femoro-caudal, and the accessory femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ.

Species examined.

Musophaga violacea. *Corythaix albo-cristata.*
Schizorhis africana.

The *Cuculidæ* possess the ambiens, the femoro-caudal, the semitendinosus and the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ ; they may be divided into two subfamilies, according to whether the accessory femoro-caudal is present or absent.

The accessory femoro-caudal is present in

Centropus senegalensis. *Guira piririgua.*
—— *phasianus.* *Phœnicophaes*, sp.

The accessory femoro-caudal is absent in

Cuculus canorus. *Cacomantis sepulcralis.*
Chrysococcyx, sp.

The *Ramphastidæ* possess the femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ; the ambiens and the accessory femoro-caudal are absent.

Species examined.

Ramphastos carinatus. *Ramphastos cuvieri.*
—— *ariel.*

The *Capitonidæ* possess the femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ ; the ambiens and the accessory femoro-caudal are absent.

Species examined.

Megalæma asiatica. *Indicator major.*
Barbatula duchaillui.

The *Psittaci* possess the femoro-caudal well developed, the semitendinosus, and the accessory semitendinosus ; the accessory femoro-caudal and postacetabular portion of the tensor fasciæ are absent. The ambiens may be present normally ; it may be differentiated in the thigh, but fail to cross the knee, being lost on the fascia over it, or it may be absent.

The ambiens is present in the following species :—

Psittacus erithacus. *Ara macao.*
Conurus xantholæmus. —— *chloroptera.*
—— *jendaya.* *Caïca melanocephala.*
—— *petzi.* *Nestor notabilis.*
—— *holochlorus.* —— *hypopolius.*

The ambiens is present, but does not cross the knee in

Stringops habroptilus.

The ambiens is absent in :—

Pyrrhura (Conurus) cruentata.
Brotogerys tiriacula.
—— *virescens.*
—— *tovi.*
—— *tui.*
Pionus menstruus.
Chrysotis festiva.
—— *ochrocephala.*
—— *levaillantii.*
Psephotus hæmatogaster.
Platycercus eximius.
—— *pallidiceps.*
Psittacula passerina.
Agapornis roseicollis.
Melopsittacus undulatus.
Euphema splendida.
—— *pulchella.*
—— *bourkii.*
Calopsitta novæ-hollandiæ.
Cacatua galerita.
—— *cristata.*
—— *roseicapilla.*
Calyptorhynchus banksii.
Lorius cardinalis.
Eos indica.
Tanygnathus muelleri.
Prioniturus, sp.
Trichoglossus concinnus.
Lathamus discolor.
Aprosmictus scapulatus.
Loriculus asiaticus.
—— *chrysonotus.*
Cyanorhamphus auriceps.
—— *novæ-zealandiæ.*
Palæornis torquata.

Accipitres.—The *Cathartidæ* possess the ambiens, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ; the accessory femoro-caudal is absent, and the femoro-caudal is present, though small, in

Cathartes atratus;

it is absent in

Gyparchus papa.

The *Serpentariidæ* possess the ambiens, the accessory femoro-caudal, the semitendinosus and the accessory semitendinosus; the femoro-caudal and the postacetabular portion of the tensor fasciæ are absent.

Species examined.

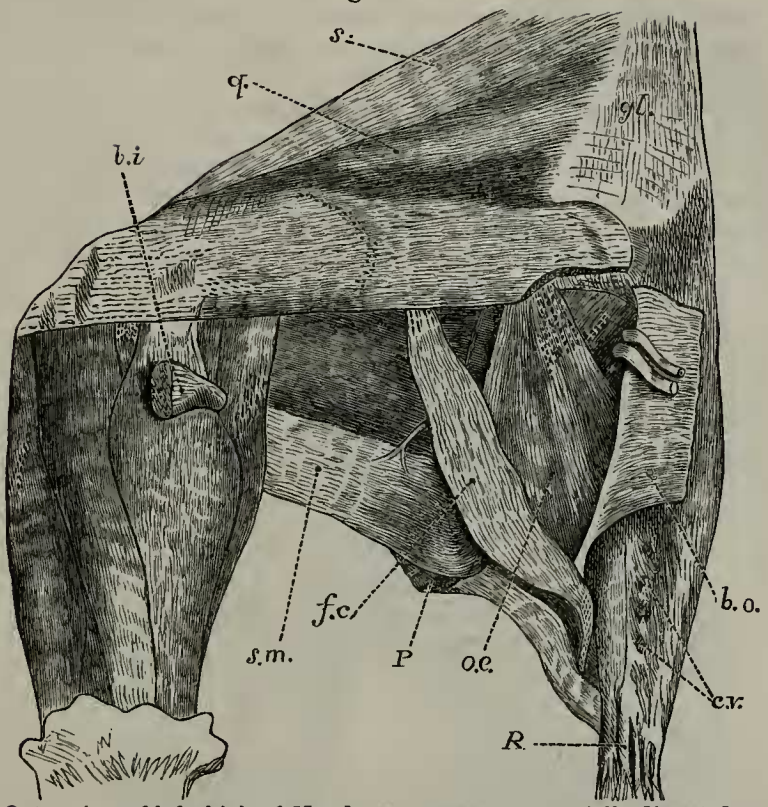
Serpentarius reptilivorus.

The *Vulturidæ* and *Falconidæ* agree in possessing the ambiens and the femoro-caudal; the accessory femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ are absent in all.

Species examined.

Neophron percnopterus.
Gyps fulvus.
Vultur auricularis.
Polyborus brasiliensis.
Milvus ictinus.
Buteo vulgaris.
Archibuteo lagopus.
Helotarsus ecaudatus.
Haliaëtus vocifer.
—— *albicilla.*
Aquila nævioïdes.
Aquila audax.
Spilornis cheela.
Thrasaëtus harpyia.
Falco peregrinus.
—— *melanogenys.*
—— *lanarius.*
Hypotriorchis subbuteo.
Tinnunculus alaudarius.
Melierax monogrammicus.
Astur palumbarius.
Circus cineraceus.

Fig. 3.



Outer view of left thigh of *Neophron percnopterus*, partially dissected.

s, sartorius; *q*, quadratus femoris; *gl*, glutei; *b o* and *b i*, biceps, origin and insertion; *f c*, femoro-caudal; *s m*, semimembranosus; *o e*, obturator externus; *P*, pubis; *R*, rectrices.

The *Strigidæ* possess the femoro-caudal, which is always small; the ambiens, the accessory femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ are absent.

Species examined.

Strix flammea.
Otus vulgaris.
—— *brachyotus.*
Syrnium aluco.
—— *nebulosum.*
Bubo maximus.
—— *virginianus.*
—— *bengalensis.*
—— *capensis.*
—— *poënsis.*
Bubo fasciolatus.
Ketupa javanica.
Scops zorca.
Athene noctua.
—— *passerina.*
—— *brama.*
Pholeoptynx cunicularia.
Glaucidium, sp.
Pulsatrix torquata.
Surnia funerea.

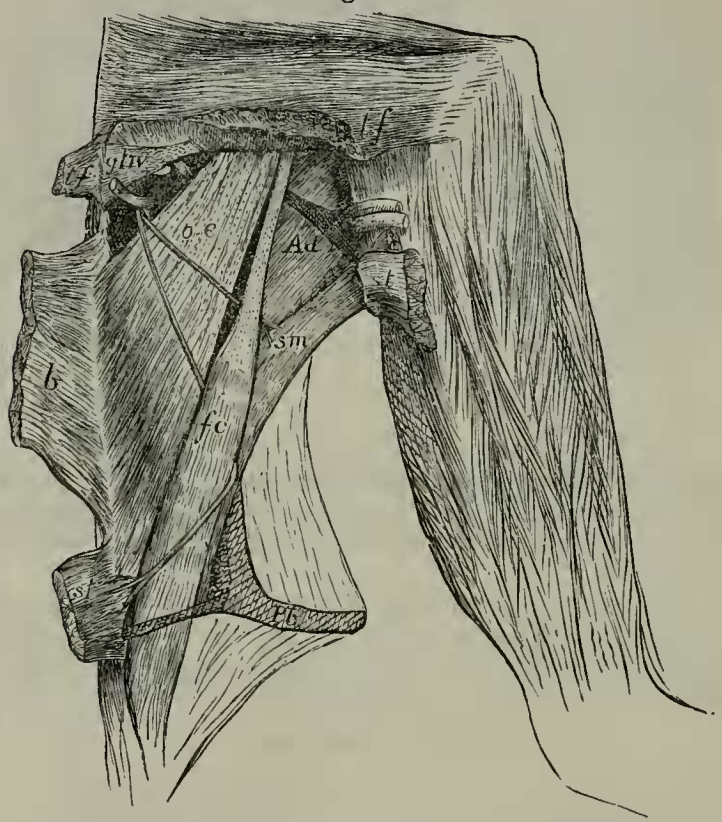
The *Steganopodes* must be considered in separate families. I have not dissected *Pelecanus*.

Fregata aquila possesses the ambiens and the femoro-caudal, the latter being very slender; the accessory femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ are absent.

Phaethon possesses the femoro-caudal (small), the semitendinosus (strong), and the accessory semitendinosus; the ambiens, the accessory femoro-caudal, and the postacetabular portion of the tensor fasciæ are absent. In this bird the biceps cruris is inserted into the fibula-head directly, without passing through a loop.

The family *Phalacrocoracidæ* possess the ambiens*, the femoro-

Fig. 4.



Outer view of right thigh of *Phalacrocorax carbo*, dissected.

t f, tensor fasciæ; *gl* IV, gluteus quartus; *o e*, obturator externus; *f c*, femoro-caudal; *Ad*, adductor; *b*, biceps; *st*, semitendinosus; *sm*, semimembranosus; *Pb*, pubis.

caudal, and the semitendinosus; the accessory femoro-caudal, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ are absent. There is a peculiarity about the obturator ex-

* Meckel did not find the ambiens in the Cormorant; it is peculiar in that it runs through the substance of the large triangular patella, in a bony canal.

ternus of these birds, which is perplexing at first sight. In *Sula* this muscle, instead of, as usual, being inserted into the outside of the head of the femur, has its attachment further forward, to the outer edge of the linea aspera, or the bony surface corresponding to it, midway between the head of the bone and the attachment of the femoro-caudal muscle. In *Phalacrocorax* it is situated still further forward, being in contact by its anterior border with the posterior margin of the femoro-caudal, parallel to it in direction, and otherwise in situation exactly like an accessory femoro-caudal. However, that it is the obturator externus and not the accessory femoro-caudal is certain, from the facts that the nerve to the semimembranosus is superficial to it, that the whole upper part of its outer surface is covered with a tendinous layer, that none of its anterior fibres blend with the posterior margin of the upper end of the tendon of the femoro-caudal, and that the presence of this muscle is constant in birds. The accessory femoro-caudal is, on the contrary, superficial to the nerve to the semimembranosus; it is not tendinous externally up to its insertion; some of its fibres blend with the tendon of the femoro-caudal just before it joins the femur; and its presence is uncertain. In *Sula* the ambiens has a tendinous link at the outer side of the knee, which runs upwards from it to the outer side of the anterior fibrous expansion over the joint.

Species examined.

Sula bassana.
Phalacrocorax carbo.
Phalacrocorax lugubris.

The *Ardeidæ* possess the femoro-caudal, though in some, as *Ardea goliath*, it is extremely narrow, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ which is very slightly developed; the ambiens and the accessory femoro-caudal are absent.

Species examined.

Ardea cinerea.
—— *goliath.*
—— *purpurea.*
—— *alba.*
Ardea egretta.
—— *garzetta.*
Nycticorax europæus.
Botaurus stellaris.

The *Ciconiidæ* possess the ambiens, the semitendinosus, and the accessory semitendinosus; the accessory femoro-caudal is absent. The femoro-caudal is very small in *Ciconia* and absent in *Leptoptilus*; and the postacetabular portion of the tensor fasciæ is the same.

Species examined.

Ciconia alba.
—— *nigra.*
Ciconia maguari.
Leptoptilus crumeniferus.

The *Plataleidæ* possess the ambiens, the femoro-caudal, the accessory femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ, which is small.

Species examined.

Platalea leucorodia.
—— *ajaja.*
Ibis rubra.
—— *strictipennis.*
Ibis melanocephala.
—— *nippon.*
—— *spinicollis.*

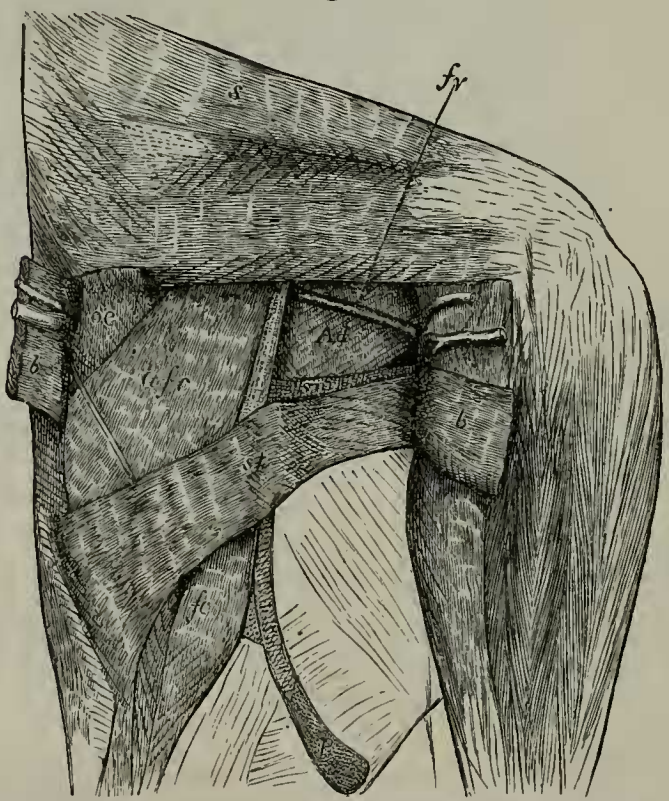
The *Phœnicopteridæ* possess the ambiens, the accessory femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ; the femoro-caudal is absent.

Species examined.

Phœnicopterus antiquorum. *Phœnicopterus ruber.*

The *Anseres* possess the ambiens, the femoro-caudal, the accessory femoro-caudal (very large), the semitendinosus, and the postacetabular portion of the tensor fasciæ; the accessory semitendinosus is absent.

Fig. 5.



Outer view of right thigh of *Bernicla brenta*, partly dissected.

s, sartorius; *o e*, obturator externus; *Ad*, adductor; *b*, biceps; *f c*, femoro-caudal; *a f c*, accessory femoro-caudal; *st*, semitendinosus; *sm*, semimembranosus; *p*, pubis; *f v*, femoral vein.

Species examined.

Anser segetum.
Bernicla canadensis.
Chloëphaga, sp.
Cygnus nigricollis.
—— *buccinator.*
—— *coscoroba.*
Dendrocygna autumnalis.
—— *viduata.*
—— *fulva.*
Tadorna rutila.
Aix galericulata.
Mareca penelope.
Dafila spinicauda.
Querquedula crecca.
Metopiana peposaca.
Fuligula cristata.
Mergus castor.
Mergellus albellus.

The *Columbæ* possess the femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ; the accessory femoro-caudal is present in all but *Lopholæmus antarcticus*. The ambiens may be present or absent; and this feature is probably a subfamily character.

The ambiens is present in :—

Pterocles alchata.
—— *arenaria.*
Lopholæmus antarcticus.
Columba œnas.
—— *livia.*
—— *leucocephala.*
—— *picazuro.*
—— *maculosa.*
—— *vinacea.*
Turtur senegalensis.
—— *aldabranus.*
Chalcopelia chalcospilos.
Chamæpelia talpacoti.
Metriopelia melanoptera.
Tympanistria bicolor.
Leptoptila jamaicensis.
Chalcophaps chrysochlora.
Ocyphaps lophotes.
Phaps chalcoptera.
Carpophaga globicera.
—— *œnea.*
Calœnas nicobarica.
Didunculus strigirostris.

The ambiens is absent in :—

Goura coronata.
—— *victoriæ.*
Geopelia striata.
—— *placida.*
—— *cuneata.*
—— *humeralis.*
Ptilonopus melanocephalus.
—— *mariæ.*
Treron calva.
Phlogœnas cruentata.
Starnœnas cyanocephala.

The *Gallinæ* possess the ambiens, the accessory femoro-caudal, the semitendinosus (large), the accessory semitendinosus (large), and the postacetabular portion of the tensor fasciæ (large); the femoro-caudal is well developed in some, small in some, and absent in a few. An asterisk is placed by the name of those in which it is absent.

Species examined.

TETRAONIDÆ.

Tetrao urogallus.
—— *tetrax.*

PHASIANIDÆ.

Francolinus vulgaris.
—— *afer.*
Francolinus ponticerianus.
—— *gularis.*
—— *clappertonii.*
Arboricola torqueola.
Perdix cinerea.
Coturnix communis.
Rollulus coronatus.

Odontophorus dentatus.
Ortyx virginianus.
Eupsychortyx cristatus.
Caccabis chukar.
Phasianus colchicus.
—— *versicolor.*
—— *reevesii.*
Thaumalea picta.
—— *amherstiæ.*
Euplocamus erythrophthalmus.
—— *vieilloti.*
—— *pyronotus.*
—— *horsfieldii.*
—— *albo-cristatus.*
Gallus bankiva.
Ceriornis temminckii.
**Pavo nigripennis.*
*—— *muticus.*
Argus giganteus.
**Meleagris gallopavo.*
Numida meleagris.

CRACIDÆ.

Crax globicera.
—— *incommoda.*
Pauxi mitu.
Penelope cristatus.
—— *pileatus.*
Ortalida albiventris.

MEGAPODIDÆ.

Talegalla lathami.
Megacephalon maleo.

Of the *Alectorides* the families will be considered separately.

In the Bustards as represented by *Otis macqueeni* and *Eupodotis denhami* the ambiens, accessory femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ are present; the femoro-caudal is absent.

In the *Œdicnemidæ* the accessory femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ are present. In *Œdicnemis bistriata* and *Œ. superciliaris* the femoro-caudal is present, but very slender. In *Œ. grallaria* it is absent. The ambiens is present in the three above-named species, but it is peculiar in being sometimes but imperfectly developed. It crosses the knee very externally, and was quite normally developed in a specimen of *Œ. bistriata* and in one of *Œ. grallaria*. In another specimen of *Œ. grallaria* it was lost anteriorly on the fasciæ covering the knee; and in one of *Œ. superciliaris* it crossed the knee, but sent off a slip on the in- and outside to join the investing fascia.

In the *Cariamidæ* the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ are present. The ambiens was absent in a specimen of *Cariama cristata*, but present in one of *Chunga burmeisteri*. The femoro-caudal was absent in both. The accessory femoro-caudal was present in *Cariama cristata*, though extremely small. It was absent in *Chunga burmeisteri*.

Among the *Gruidæ*, *Grus antigone* possesses the ambiens, the femoro-caudal (very small), the accessory femoro-caudal (small), the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ, as does also *Anthropoides virgo*.

Among the *Eurypygidæ*, *Rhinochetus jubatus* possesses the ambiens, the femoro-caudal (extremely thin), the semitendinosus, and the accessory semitendinosus; the accessory femoro-caudal is absent.

The *Rallidæ* possess the ambiens, the femoro-caudal, the accessory femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ.

Species examined.

Rallus aquaticus.
Aramides cayennensis.
Porzana americana.
—— *carolinensis.*
Crex pratensis.
Ocydromus sylvestris.
Porphyriomadagascariensis.
—— *melanotus.*
Gallinula chloropus.

The *Grallæ* possess the ambiens, the femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ; the accessory femoro-caudal may be present or absent.

It is present in :—

Glareola, sp.
Numenius arquatus.
—— *phæopus.*
Hæmatopus niger.
Charadrius hiaticula.
Himantopus nigricollis.
Parra africana.

It is sometimes present (very small), sometimes absent, in :—

Charadrius pluvialis.
Vanellus cristatus.

It is absent in :—

Strepsilas interpres.
Limosa rufa.
Totanus calidris.
—— *solitarius.*
Gambetta flavipes.
Machetes pugnax.
Scolopax rusticola.
Gallinago scolopacina.
—— *gallinula.*
Calidris canutus.
Tringa cinclus.

The *Gaviæ* possess the ambiens, the femoro-caudal, the semitendinosus, and the accessory semitendinosus; the postacetabular portion of the tensor fasciæ is slightly developed in *Larus* and *Lestris*, but not in *Sterna*; the accessory femoro-caudal is present, though small, in *Sterna*, but absent in *Larus* and *Lestris*.

Species examined.

Lestris antarcticus.
Larus argentatus.
Larus glaucus.
Sterna hirundo.

The *Procellariidæ* must be considered under two divisions, the Storm-Petrels and the true Petrels.

The Storm-Petrels possess the femoro-caudal, the accessory femoro-caudal, the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ; the ambiens were present in a black one, but quite absent in three specimens of a light-grey species.

Species examined.

Procellaria pelagica?
Procellaria fregata?

The true Petrels possess the ambiens, the femoro-caudal, the accessory femoro-caudal, and the semitendinosus; the postacetabular

portion of the tensor fasciæ is very small or absent, and the accessory semitendinosus is present in all but *Bulweria bulweri*.

Species examined.

Œstrelata lessoni?
Prion vittata.
Daption capensis.
Bulweria bulweri.
Puffinus anglorum.

and some unnamed specimens.

The *Pygopodes* consist of two distinct families.

Among the *Colymbidæ*, *Colymbus glacialis* possesses the ambiens, the femoro-caudal, the accessory femoro-caudal, the semitendinosus, and the postacetabular portion of the tensor fasciæ; the accessory semitendinosus is absent.

The *Podicipidæ* possess the accessory femoro-caudal, the semitendinosus, and the postacetabular portion of the tensor fasciæ; the ambiens, the femoro-caudal, and the accessory semitendinosus are absent. In these birds the semimembranosus is very thin in *Podiceps minor*; in specimens preserved in spirit I have not seen it, probably because it is so slender.

Species examined.

Podiceps cristatus.
—— *minor*.
Podiceps novæ-hollandiæ.

The *Alcidæ* possess the femoro-caudal, the accessory femoro-caudal, the semitendinosus, and the postacetabular portion of the tensor fasciæ; the ambiens and the accessory semitendinosus are absent.

Species examined.

Alca torda.
Uria troile.
Arctica alle.

The *Impennes* possess the ambiens, the femoro-caudal, the accessory femoro-caudal, and the semitendinosus; the accessory semitendinosus and the postacetabular portion of the tensor fasciæ are absent. In *Eudyptes* the insertion of the femoro-caudal is much nearer the condyloid end of the femur than to the head.

Species examined.

Aptenodytes pennantii.
Spheniscus demersus.
Spheniscus humboldti.
Eudyptes catarractes.

The *Crypturi* possess the ambiens, the femoro-caudal, the accessory femoro-caudal (which has a slip arising above the sciatic foramen, found elsewhere only in the *Struthiones*), the semitendinosus, the accessory semitendinosus, and the postacetabular portion of the tensor fasciæ.

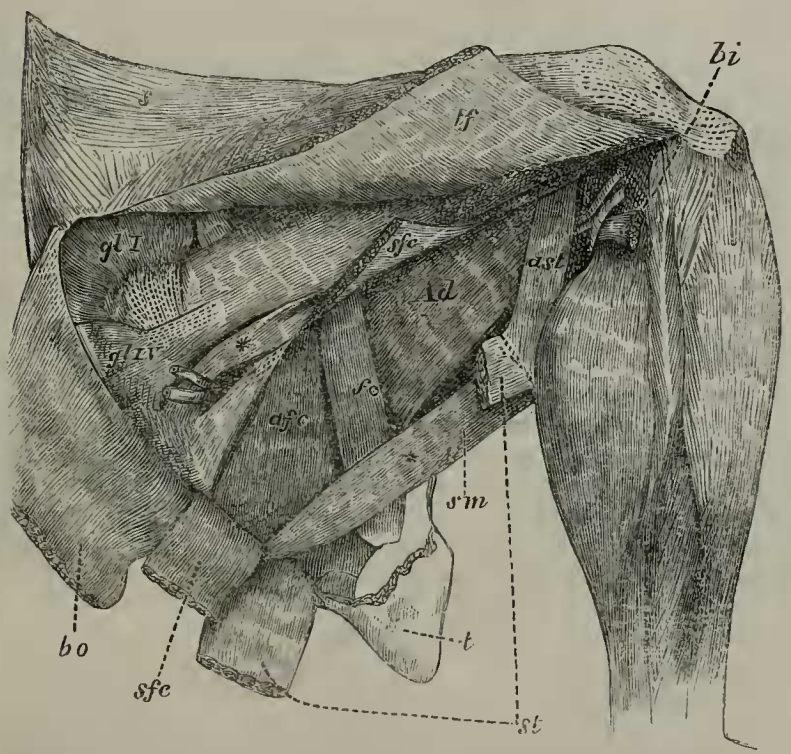
Species examined.

Rhynchotus rufescens.
Crypturus obsoletus.
Crypturus sallæi.
—— *noctivagus*.

The *Struthiones* present marked peculiarities.

In *Apteryx* the postacetabular portion of the tensor fasciæ is very large, and slightly overlapped at the lowest point of its origin by the posterior superior portion of the semitendinosus. The semitendinosus is well developed, and has a broad accessory head. The accessory femoro-caudal is peculiar; for, on removing the biceps cruris, its su-

Fig. 6.



Outer view of thigh of *Apteryx owenii*, dissected.

s, sartorius; *t f*, tensor fasciæ; *b o* and *b i*, biceps, origin and insertion; *gl*, I and IV, gluteus primus and quartus; *st*, semitendinosus; *a s t*, accessory semitendinosus; *sm*, semimembranosus; *s f c*, superficial femoro-caudal; *f c*, femoro-caudal; *a f c*, accessory femoro-caudal; *Ad*, adductor. The asterisk on the semimembranosus is on the spot at which its second or true insertion is; the other asterisk is placed on the slip of the accessory femoro-caudal (in this case specially modified), which is found in Struthious birds and the Tinamous only, above the sciatic vessel and nerve.

perficial portion is seen running obliquely upwards and forwards to the whole length of the linea aspera of the femur, from its usual origin. The sciatic artery and nerve are superficial to this muscle (adductor longus of Owen), and parallel to its insertion, as in most birds; but they, as is not the case except in the *Struthiones* and *Crypturi*, perforate it at the sciatic notch, leaving a small portion of the muscle (the adductor brevis of Owen) above them. The anterior

terminal fibres of this muscle are situated external or superficial to the accessory semitendinosus.

After this muscle has been removed or turned back, there is seen a deeper muscle, which, if the one described above did not exist, would be justly considered to be the true femoro-caudal and the accessory femoro-caudal, part springing from the iliac ridge and part from the coccyx, whilst both are inserted into the posterior portion of the linea aspera and have the nerve to the semimembranosus situated between them and the adductor magnus.

The semimembranosus is also peculiar in having a second head of origin from the ischium, behind the femoro caudal, and just in front of the origin of the semitendinosus, so that the femoro-caudal runs partly in a separate canal between the two heads of origin of this muscle and covered by it.

The other muscles are present as in most birds. The ambiens is strong.

Species examined.

Apteryx owenni. *Apteryx mantelli.*

In *Casuarius* the postacetabular portion of the tensor fasciæ is very large, and is overlapped below and behind by the semitendinosus near its origin; the femoro-caudal forms a small cylindroidal belly, which is continued upwards as a narrow tendon; the accessory femoro-caudal is enormous, being perforated by the sciatic artery and nerve; it replaces to a great extent the obturator externus, which is peculiarly small and situated anterior to it in origin, as usual. The semitendinosus is present and has a broad accessory head. The ambiens is absent. The other muscles are as in most birds.

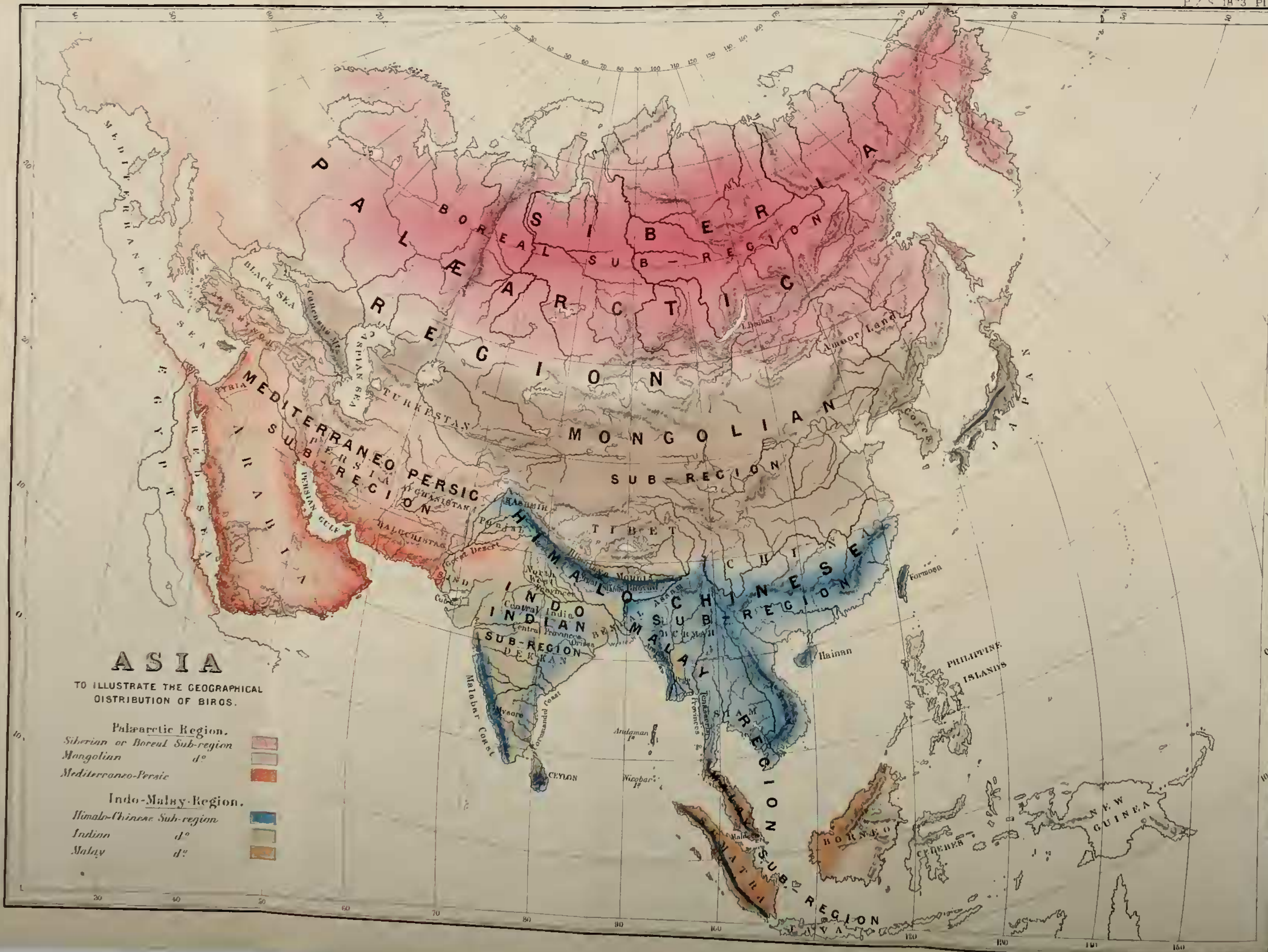
Species examined.

Casuarius bennettii. *Casuarius bicarunculatus.*
—— *galeatus.*

In *Dromæus novæ-hollandiæ* the semitendinosus is larger than in *Casuarius*, and the accessory head is large; the femoro-caudal is absent; and the accessory femoro-caudal is very large, being pierced by the sciatic artery and nerve. The biceps cruris is very peculiar in not being inserted in its usual characteristic manner, but ending a little anterior to the middle of the thigh very indefinitely, blending with the fasciæ in that region, and not being continued directly to the fibula at all. The semimembranosus also is peculiar in having an aponeurotic connexion with the middle of the linea aspera, from about the middle of its course. The ambiens is absent.

In *Rhea americana* a somewhat similar condition is found. The biceps is normal; and the semitendinosus, the accessory semitendinosus, as well as the postacetabular portion of the tensor fasciæ are much as in *Casuarius* and *Dromæus*. The femoro-caudal is absent; the accessory femoro-caudal is large, being perforated by the sciatic artery and nerve; and the ambiens is strong.

In *Struthio camelus* the ambiens is also well developed.


ASIA
TO ILLUSTRATE THE GEOGRAPHICAL DISTRIBUTION OF BIRDS.
Palæarctic Region.
Siberian or Boreal Sub-region
Mongolian d°
Mediterraneo-Persic
Indo-Malay-Region.
Himalo-Chinese Sub-region
Indian d°
Malay d°
PALÆARCTIC REGION
SIBERIA
BOREAL SUB-REGION
MONGOLIAN
SUB-REGION
MEDITERRANEO PERSIC
SUB-REGION
HIMALO-CHINESE
SUB-REGION
INDO-MALAY REGION
INDIAN
SUB-REGION
MALAY SUB-REGION
MEDITERRANEAN SEA
BLACK SEA
CASPIAN SEA
EGYPT
ARABIA
RED SEA
PERSIAN GULF
SYRIA
PERSIA
TURKESTAN
AFGHANISTAN
BALUCHISTAN
KASHMIR
TIBET
CHINA
JAPAN
Amoor Land
L. Baikal
Corea
Formosa
Hainan
PHILIPPINE ISLANDS
Malabar Coast
Mysore
Coromandel Coast
CEYLON
DEKKAN
Andaman Is.
Nicobar Is.
SIAM
BORNEO
SUMATRA
CELEBES
JAVA
NEW GUINEA

10. On the Geographical Distribution of Asiatic Birds.

By H. J. Elwes, F.Z.S.

[Received May 24, 1873.]

(Plate LI.)

The geographical distribution of animals, a subject for many years neglected by naturalists, has lately been taken up by some of our best zoologists; and though the day is far distant when it will be possible to decide with any certainty how far their conclusions are borne out by geology, botany, and other branches of natural history, it must be allowed that the work done by them is extremely valuable and interesting.

With regard to the distribution of birds, Mr. Sclater's paper in the 'Journal of the Proceedings of the Linnean Society' for 1859, is the first, both in date and importance; but so rapidly has our science advanced that it is already in some respects capable of improvement; and though my attempt to throw some additional light on the subject is but a very imperfect one, I hope it will show how much remains to be done in this direction.

Our knowledge of Asiatic birds has within the last few years been immensely increased by the travels and researches of several eminent naturalists, among whom the names of Wallace, Jerdon, Swinhoe, David, and Hume stand very high. Indeed I may say that in no part of the world has so much zoological research and discovery been recently made as in Asia. Having been led by my own travels in one of the richest and most interesting parts of the Himalaya to examine the curious problems in geographical distribution which constantly presented themselves, I have put together some notes on the results of my inquiries, and beg the utmost indulgence in bringing them forward, hoping that, if my conclusions are not generally accepted, they may be the means of attracting some more competent naturalist to the elucidation of the question.

It appears to me that the best means of acquiring a true knowledge of the geographical affinities of a local fauna is to make as accurate a list as possible of the species found in a district of moderate dimensions, and to analyze them carefully so as to find the proportion of peculiar and widely distributed species in it. If we go on the principle of merely selecting a few notable or peculiar forms, without reference to the much larger number of species (which for our purpose are equally important), we may easily be led into false tracks. Though in some cases the lists which I have drawn up are very incomplete, yet I think that they are sufficiently perfect for my present purpose; and as accuracy of nomenclature is less important than correctness of locality, I have been especially careful on the latter point.

I have restricted my work, however, almost entirely to the land-birds, as I found that the waders and water birds, being mostly of very wide distribution, would have added very much to the labour of the analyses, and are of little use in showing the affinities and peculiarities of a local fauna.

The attempt to account for the various facts which are here and there brought to light is a task far beyond my power or inclination, more especially as I do not see how we can speculate with much advantage on the causes which have influenced the distribution of birds whilst our ignorance of the distribution of other animals is so great.

On the map (Plate LI.) to which I beg leave to draw your attention, I have shown the ornithological divisions into which I believe Asia may be divided; and though, as is obvious, a hard and fast line can never be drawn between the different regions and subregions, yet in some places (as, for instance, "Wallace's line" and the Himalaya mountains) they are separated by a distance which is on the map hardly appreciable.

The connexion between climate, physical geography, and ornithology is much closer in Asia than would be supposed by any one who had not travelled there. All over the Indo-Malay region, wherever hills exceeding 3000 or 4000 feet high are found, a moister climate and more luxuriant vegetation is sure to be accompanied by a corresponding change in the birds.

So much is this the case that wherever in India, South China, and the Indo-Chinese countries an elevation of 4000 feet is reached, some of the birds characteristic of the Himalaya are almost sure to be found.

Another point that has struck me is that in Asia almost every genus of birds found in Europe is represented by some, and often by a greater number of similar or allied species. This would seem to show, what I believe is equally true of plants and animals, that the birds of Europe have been derived from the east; and though we have got into a habit of considering many genera of birds especially characteristic of Europe, it is only because we know so much less of their distribution in Asia.

This of course applies principally to the temperate regions of Northern and Central Asia; but I think it impossible to gain a correct idea of European ornithology without a considerable knowledge of the whole Palæarctic avifauna.

A large number of genera and families found in Tropical Asia are also common to Africa; and though I do not think we can place the two continents in the same zoological region (as Mr. Murray has done in his work, 'The Geographical Distribution of Mammalia'), yet I believe a careful comparison of generic forms from Africa and Asia would result in the union of several genera which are now separated.

One of my greatest difficulties has been the want of a really reliable work on the genera of birds; for though I have in most cases followed the arrangement of Mr. Gray's 'Hand-list,' I have often found that the uncertainty of classification which prevails has diminished the confidence which I should otherwise have had in some portions of my work.

I will now endeavour to show how far the conclusions I have formed are borne out by facts, and hope that my attempt to deal in a connected manner with so vast a subject will be found to contain the elements of truth.

PALÆARCTIC REGION.

The greater part of Asia is now universally admitted to belong to the great Palæarctic region, which, though (as pointed out by Dr. Sclater) the most extensive in the world, is zoologically the poorest.

Of the whole country between the Russian dominions in Siberia and our own in India we know so little that I have not been able to find a single locality in which the materials necessary for analysis have been collected.

It is, however, reasonable to suppose that the immense deserts of Mongolia, the steppes of the Kirghiz, and the snowy mountains of Thibet contain but little variety of species, and that we shall be safe in including them in the Palæarctic region until they are better known.

Turkestan.

In Russian Turkestan M. Severtsoff has collected largely; and though no account has been given of the birds he obtained, I believe they were mostly species which are known to occur in Western Siberia and Persia.

From Yarkand a few birds new to science were recently brought by Dr. Henderson *, by far the most interesting among them being two species of *Podoces*, a genus restricted to Central Asia, and supposed by Mr. Hume to be more nearly allied to the Timaliinæ of India and Africa than to the Corvidæ, in which it was placed by Bonaparte.

In the mountain-ranges which cover a great part of Persia and Afghanistan the fauna becomes more like that of Eastern Europe, a few genera only, such as *Erythrospiza*, *Carpodacus*, and *Tetraogallus*, being remarkable.

Afghanistan.

Of the birds of Afghanistan we have no detailed account, except that by Capt. Hutton (J. A. S. B. 1847, p. 775), by which it appears that in a collection of 66 species of land birds made at Candahar there were as follows:—

Species common to India and Europe	38
Found in Europe only	12
In India only	12
In neither	4

Among the European birds the most remarkable are *Pica caudata*, *Loxia curvirostra*, *Merula vulgaris*, *Sitta syriaca*, *Alcedo ispida*, *Sturnus unicolor*; but almost the only one among the Indian birds which strikes me as unexpected is *Myiophonus temmincki*, which, if a resident in the country at all, must be very local. *Tetraogallus caucasicus* has not been recorded so far east as this by any other naturalist. It is therefore doubtful what, if any, species of that genus will be found in the north of Afghanistan and Badakshan.

Persia.

Of the birds of Persia I have, through the kindness of Mr. Blan-

* See Lahore to Yarkand: London, 1873.

ford, a list, which, though not complete, is a very great advance on any thing hitherto published, and includes about 180 species of land birds. To these I have added about 20, which are noticed in Philippi's 'Viaggio in Persia;' and though Mr. Blanford had not at the time I saw his list determined the species of many of his birds, yet in the present instance the genera are quite enough to show the character of the fauna. It shows that 127 Persian species are found in Europe; 37 are allied species belonging to European genera; 15 are species of N.E. African type; 3 are species of Indian type, viz. *Malacocercus, Chatarrhæa,* and *Otocompsa*; 7 are species of Central-Asian type, viz. *Carpodacus, Metoponia, Erythrospiza, Tetraogallus, Rhodopechys,* and *Phasianus.*

Arabia.

The greater part of Arabia probably belongs to the Palæarctic region; but as we know nothing whatever of the interior, it is quite possible that in the mountain-region of the south-west some Ethiopian forms may occur. The cultivation of the coffee-tree proves that there must be a region very different in climate and vegetation from the coast; and it is to be hoped that some enterprising traveller will ere long make us better acquainted with what must be an extremely interesting country.

At present less is probably known of the birds of Arabia than of any equally extensive region on the globe.

Palestine.

Of Palestine I need say but little, Canon Tristram having already so well described the birds of this country. By his computation (P. Z. S. 1864, p. 456), of 322 species noted in Palestine, 260 are included in the European lists; 31 are common to Eastern Africa, and are chiefly desert species of Nubia and the Sahara; 11 are of Eastern or Northern Asia; 4 are Gulls and Terns of the Red Sea; 27 are peculiar to Palestine and adjacent countries.

The most remarkable birds included in Canon Tristram's list are:—*Ketupa ceylonensis* (which, unless a straggler, must surely be found in some part of Persia), *Ixos xanthopygius, Crateropus chalybeus, Nectarinia osea, Amydrus tristrami, Bessonornis albigularis* (also found at Smyrna and in Persia), *Caccabis heyi,* and *Struthio camelus.*

Of Asia Minor it is still less necessary to speak. We know but little it is true; but there can be no doubt that the birds are very similar to those of Turkey in Europe, though a few, such as *Tetraogallus caucasicus,* here find their western limit.

Siberia.

Siberia now claims our attention; but though it occupies a very large surface on the map, the country is chiefly remarkable for the scarcity of birds in most parts of it. Pallas, Middendorff, Radde, and Schrenck are the authors whose writings comprise nearly the whole of our knowledge of Siberian ornithology; but though the country can only be said to be partially explored, it is not likely that many new species remain undiscovered.

The western half of Siberia is probably very similar to Russia in Europe; but I do not know of any locality which has been systematically examined until we come to Dahuria, where MM. Dybowski and Parrex have for some years paid much attention to natural history.

The list of birds published by these gentlemen in the 'Journal für Ornithologie,' 1868, and reviewed in the same publication for 1870 by Taczanowski, shows that the genera found there are nearly all common to Europe—*Nemura cyanea*, *Uragus sibiricus*, and *Leucosticte arctoa* being almost the only exceptions.

A *résumé* of the works of Middendorff, Radde, and Schrenck, so far as they treat of ornithology, has been published by Herr von Homeyer in the 'Journal für Ornithologie' for 1868–70, which gives the range of most of the species inhabiting Eastern Siberia as far as they are known. We find that European species are still in a great majority, though in the S.E. part of Siberia, which borders on the Amoor river, some migrants appear in summer which have an entirely different range—such as *Zosterops chloronotus*, *Eurystomus orientalis*, *Pericrocotus cinereus*, *Oriolus indicus*, and *Turtur humilis*.

The birds of prey, 33 in number, are all well-known European species, except *Haliaëtus pelagicus*, *Falco amurensis*, *Milvus melanotis*, *Circus melanoleucus*, and *Nyctale barbata*.

The Passeres and Picariæ, of which 151 species are named, may be classed as follows:—

		per cent.
Either peculiar to North Asia or only known elsewhere as stragglers	63	41
Birds common to Europe	77	51
Migratory from S. Asia	11	8

As in Europe, the predominant families are the Turdidæ, Sylviadæ, and Emberizidæ, no less than 12 species of the genus *Emberiza* being found.

Among the game birds there are some which, like *Tetrao tetrix* and *T. betulina*, range to the other extreme of the region, whilst others, such as *Tetrao urogalloides* and *T. falcipennis*, are peculiar to its eastern extremity.

The wading and water birds, which amount to 132 species, are mostly European or Arctic species. Some, however, such as *Anser grandis*, *A. cygnoides*, *Anas galericulata*, *Ibis nippon*, and *Grus leucauchen*, spend their winters in China. *Phœnicopterus roseus* has occurred at Lake Baikal, and is, no doubt, common on the salt lakes of Mongolia. *Grus leucogeranus* and *Anas pœcilorhyncha* extend their migrations to the plains of India.

The following birds, which are all common to Amoorland and N. Europe, do not appear to extend so far as Japan, though the birds of that archipelago are very closely connected with those of E. Siberia:—

Gecinus canus.
Picus major.
Picus minor.
—— *tridactylus*.

Mecistura caudata.
Cotyle riparia.
Accentor alpinus.
Calamoherpe aëdon.
Regulus cristatus.
Emberiza pityornis.
—— *pusilla.*
Corythus enucleator.
Plectrophanes nivalis.
—— *lapponica.*
Perisoreus infaustus.
Lagopus alpinus.
Tetrao tetrix.
—— *bonasia.*
Otis tarda.

North China.

To define the limits of the Palæarctic region in China is, with our present knowledge, impossible; and much of course depends on temperature and local circumstances. From the observations of Mr. Swinhoe and the Abbé David, however, it is clear that all the northern part of the country belongs to it, as well as a great deal of the mountainous country bordering on Thibet, in which a large proportion of Himalayan forms will no doubt also be found.

The list of birds from the province of Tchili, where for several years the Abbé David has resided, gives me ample material for showing this; and though it does not agree in some points with Mr. Swinhoe's revised 'Catalogue of Chinese Birds,' I think I may trust it as being a faithful and fairly complete one. It includes 290 birds which have been observed by him at or near Pekin, 200 of them being land birds; of these there are:—

		per cent.
European birds	65	32·5
European genera, but not found out of Asia except as stragglers.....	105	52·5
Genera not found in Europe	30	15

Of the latter, some are birds of Northern or Central Asia, such as:—

Temenuchus dauricus.
Erythrospiza mongolica.
Uragus sibiricus.
Syrrhaptes paradoxus.
Crossoptilon mantchuricum.

The rest are summer migrants from S.E. Asia, as:—

Halcyon pileatus.
Chibia brevirostris.
Dicrurus macrocercus.
Buchanga leucogenys.
Tchitrea affinis.
Pericrocotus cinereus.
—— *brevirostris.*
Cyanoptila cyanomelana.
Xanthopygia leucophrys.
Myiophonus brevirostris.
Zosterops erythropleurus.
Eurystomus orientalis.
Nemoricola indica.
Urocissa sinensis.
Turnix maculosa.

Or residents of Himalayan type, as:—

Pterorhinus davidi.
Abrornis armandi.
Suthora webbiana.
Pucrasia xanthospila.

Of the waders and water birds a much larger proportion are European; but there are also many confined to Asia, of which, perhaps, *Ibidorhynchus struthersi* is the most interesting. This bird was supposed to be restricted to the higher regions of the Himalaya, where it frequents the beds of shallow streams; but it has been found by M. David in Setchuan and Mongolia, as well as at Pekin. The occurrence of a small Swan, described by Mr. Swinhoe as *Cygnus davidi*, but which M. David himself identifies with *Cygnus coscoroba*, is, if rightly referred to the latter species, a most remarkable fact, as this species has not, I believe, been previously observed out of S. America.

Otis tarda was found by M. David in Mongolia. It has also occurred in the Peshawur valley, according to Mr. Hume; so that it has a wider range than any bird of its family.

Japan.

The last place included in the Palæarctic Region to which I shall refer is Japan, of which the birds are imperfectly known to us from several sources, Temminck's 'Fauna Japonica' being the most important.

Some curious instances of anomalous distribution are presented; and though the general facies of the fauna is decidedly European, the occurrence in the same group of islands of species so impossible to associate as *Carpophaga ianthina*, *Cyanopica cyanea*, *Phasianus versicolor*, and *Lagopus mutus* must be regarded as very curious. It is much to be wished that the distribution of these birds in the different islands was better known; and I cannot help thinking that a detailed study of the distribution and affinities of the Japanese fauna and flora would prove of great interest to a person competent to undertake it.

The number of land birds I find recorded from Japan is about 134, of which 24 birds of prey may be omitted, as, with the exception of *Ninox japonica*, they are all of very wide-ranging genera, and all but 4 are species also found in Europe. Of the remainder I find

		per cent.
Peculiar to Japan	21	19
Common to Europe and Asia	32	29
Common to Asia only	57	52
Of the genera		
Of very wide range	32	
Indo-Malayan	12	
Palæarctic	56	
Common to Europe	79	

Among the most remarkable of Japanese birds are:—*Microscelis amaurotis*, the only member of the tropical family of Brachypodidæ which extends so far north; *Vinago sieboldi*, a fine Pigeon belonging to the Treroninæ; two peculiar species of Pheasants, both of which have been introduced into Europe; *Uragus sanguinolentus*, a beautiful Finch unknown elsewhere; and several birds of European

genera which appear to be confined to Japan, such as *Sitta roseilia*, *Erithacus komadori*, *Chlorospiza kawarihiba*, and *Parus varius*. Some others, such as *Cinclus pallasi*, *Merula mandarina*, *Tchitrea principalis*, *Accentor rubidus*, *Erithacus akahige*, *Regulus japonicus*, and *Ampelis phœnicoptera* also occur on the mainland of China.

INDO-MALAY REGION.

Having now examined by far the larger part of the continent of Asia, we will turn to what has been named by Mr. Sclater the "Indian Region." It has been said by some, whose acquaintance with the fauna of India is very great, and whose opinions must therefore have much weight, that the title is an unfit one, because the birds and animals of India belong not to one, but to at least three distinct zoological provinces. This is no doubt the case to some extent; and I cannot help seeing that the genera and species characteristic of what is correctly termed India * are very few in number compared with those that are only found in the mountainous region north and east of it, and in the Malay peninsula and islands.

If, however, we call it the Indo-Malay region, we shall, I think, be more accurate; and though the title given by Mr. Sclater has already established its position in general use, I hope he will allow that the reasons I shall show for proposing to change it are well founded.

If an ordinary collection of birds from any part of the coast or plains of India be examined, it will be found remarkably devoid of variety and interest, so that one might have extensive collections from many widely distant parts of the country without getting one half of the birds which are to be found abundantly in their peculiar habitats.

A large number of the species would be waders and water birds; and more than half the remainder would belong to genera of such cosmopolitan distribution that one might say India was, for its size and position, one of the poorest zoological regions in the world. Mr. Wallace, however, has shown ('Ibis,' 1859, p. 451) that the exact contrary is the case; and as he only takes the number of species known in the whole region at 1500, which is much under the mark, his statement can hardly be controverted. From where then does this great abundance of birds come? Almost entirely from the mountains which hem in India on the north and east, and crop up in various parts of the peninsula, or from the Malay peninsula and islands. Out of probably 1500 species of land birds known to occur within the limits of the region, not more than 200 are found generally in India if we exclude mountains above 4000 feet.

The Indo-Malay region, and especially that part of it which I call the Himalayan or Himalo-Chinese subregion, is essentially a region of forests and mountains; and as the best-known parts of Hindostan and China consist of level and highly cultivated plains, the birds which are most generally found all over the region are, with some exceptions, not the birds most characteristic of it.

The zoological resemblance between the greater part of Hindostan

* *Vide* Mr. Blanford's remarks on this subject, J. A. S. B. 1870, p. 336.

and Africa, which has been insisted on by some writers of great eminence, does not now appear to me to be so strong as it did at first sight, and as I thought it was when I began to go into the question.

During my stay in India I visited and collected more or less in the Carnatic, Travancore hills, Bengal, Lower Assam, N.W. Provinces, Punjab, and Central Provinces; but I was never long enough in any part of the country except Sikkim to acquire more than a general idea of its ornithology. I then supposed that the birds of the plains generally had little in common with those of the Malay countries; but when I began to examine and analyze lists from various parts of the country, I found that, though such genera as *Centropus*, *Malacocercus*, *Pycnonotus*, *Dicrurus*, *Ploceus*, *Thamnobia*, and *Pyrrhulauda* are the most conspicuous and constantly observed, yet wherever the country becomes hilly or better wooded, as in many parts of Southern, Central, and Western India, the almost certain occurrence of such genera as *Pitta*, *Myiophonus*, *Hypsipetes*, *Pericrocotus*, *Phyllornis*, *Carpophaga*, or of some species of the Malayan Hornbills, Woodpeckers, and Barbets, shows to my mind conclusively that the general absence or scarcity of Malay forms is only the result of the general absence of suitable climate and vegetation. To strengthen this opinion it may be mentioned that since the planting and preservation of trees, which has taken place in some parts of the country of late years, an increase in the number and variety of tree-loving birds has been remarked. Most of these are of Malay rather than African genera *.

In all the hills of Southern and Central India, such as the Pulnies, Neilgherries, Shevaroys, Eastern Ghats, Mahadeva, and Gawilgarh hills, in the whole range of the Western Ghats, in the jungles of Midnapore, Sumbulpore, and the Mahanuddy, and even as far north as the isolated range of Mount Abu, these Indo-Malay types will be found in more or less abundance. They are frequently accompanied by the aboriginal races of men, who, like the birds, have fled before cultivation and the persecution of a superior race to the most inaccessible jungles and mountains. A better acquaintance with these hill-ranges, many of which are still lamentably unknown, will probably show that the Malay fauna is present in a more or less

* P.S. As considerable objection was made to this theory by some gentlemen present at the meeting when this paper was read, I would say, to prevent misunderstanding, that though I am not prepared to deny the existence of sufficient resemblance between the fauna of Africa and India to justify their union into one region, yet as long as they are kept separate, which (from an ornithological point of view alone) seems desirable, I think that the birds of India have more affinity, both generically and specifically, with the birds of the Indo-Malay than with those of the Ethiopian region. After carefully and impartially analyzing the most accurate lists I can obtain of the birds found in various parts of it, as well as in the country generally, I can find hardly any genera really characteristic of the Ethiopian region—many which are often considered so, such as *Tchitrea*, *Zosterops*, *Dicrurus*, *Ploceus*, *Estrelda*, being equally well represented in countries east of India; while others, such as *Aquila*, *Gyps*, *Saxicola*, *Pratincola*, *Pterocles*, *Galerida*, &c., are really far more characteristic of the S. and S.E. parts of the Palæarctic region.

fragmentary condition over the greater part of the peninsula of India.

Mr. Blanford's remarks on this subject, in the 'Journal of the Asiatic Society of Bengal,' 1871, p. 216, are very interesting, and lead us to hope that this gentleman, whose great knowledge of the physical geography, geology, and zoology of India fits him so well for the task, will give us sooner or later a more detailed account of the minor divisions of the Indian province, which he has already sketched out in the same journal, (*vide* P. A. S. B. 1870, p. 335).

Mr. Blanford, in the paper I have referred to (J. A. S. B. 1870, p. 335), divides India alone into four provinces, and one of these again into four subprovinces. Though I agree with him in the main, I think that such minute divisions tend, in the present state of our knowledge, to confuse those who have no personal knowledge of the country; and I shall therefore only notice those of his divisions which are marked by such remarkable forms or abundance of peculiar species that they will be understood by those whose acquaintance with the subject is only general.

Himalayan or Himalo-Chinese Subregion.

This subregion, according to my view, includes all the middle region of the Himalaya from 3000 or 4000 up to 10000–12000 feet, and extends from Cashmere, right through Nepal, Bhotan, the hill-ranges surrounding the valley of Asam, and all the unknown hilly region, thence to the coast of China south of about latitude 30° N., including the islands of Formosa and Hainan, and probably the whole of Siam, Cochin China, and Anam, though of this country we know next to nothing. It also includes all the hilly region of Burmah and the Tennasserim mountains, merging into the Malayan subregion about lat. 12° N. Its northern limit is of course very indefinite, as the country north and east of Assam is absolutely unknown; but it is probable that it includes a great part of East Thibet and the head-waters of the rivers which unite near Sudya to form the Bramaputra. It is characterized by an abundance of species and a great variety of peculiar forms, many of which, from their rarity in collections and from our ignorance of their osteology, are not as yet classified with any certainty.

In its western part it is merely a narrow border land, in which the inhabitants of two very different faunas lying north and south of it mingle, and, being inhabited at some seasons of the year by representatives of nearly all the principal Indian and Palæarctic genera, probably includes some of the richest localities in the whole world.

We will now examine the different parts of the subregion, beginning from its western limit.

Kashmir.

The birds of Cashmere are now pretty well known; but no connected account of them has been published, except that given by Adams in the Society's 'Proceedings' for 1859. It gives a good idea of the ornithology of the country; and having struck out some species which do not properly belong to it, and added a good many which have been since

noticed by Brooks, Hume, and others, I find (excluding the waders and water birds, which are probably more numerous here than in any other part of the Himalaya) 116 genera, containing 171 species:—

		per cent.
Genera characteristic of the Palæarctic region	32	27·5
Peculiar to or characteristic of the Himalayan subregion	21	18
Characteristic of the whole Indo-Malay region	29	25
Cosmopolitan or very wide range	34	29·5

Of the species, about 40 per cent. are peculiar to the Himalayan mountains; but only two, namely *Cephalopyrus flammiceps*, Burt., and *Pyrrhula aurantiaca*, Gould, are peculiar to this part of the range.

In Kashmir we have evidently reached the north-western limit of the Himalayan fauna: only about 70 of its peculiar species occur here, against 340 in Nepal; while, on the other hand, Palæarctic species are comparatively much more numerous, being as 50 species against about 60 in Nepal.

The greater part of Kashmir, politically speaking, belongs to the region north of the Himalaya, and is very poor in bird life; but in winter the valley is said to be the resort of multitudes of wild fowl from the north. Warblers of the genera *Phylloscopus* and *Reguloides* seem very abundant in the forests, no less than 10 species having been noted by Mr. Brooks in a short trip; but of *Timaliidæ* there are but very few, and only 3 Bulbuls. *Chalcophaps indica*, *Gallus ferrugineus*, 4 species of *Palæornis*, and a Hornbill extend thus far to the north-west, and here meet several European species which do not extend much further into India.

Passing from Kashmir to the south-west, we find the number of species gradually increasing, till in Kumaon nearly all the principal Himalayan and Indian genera are found; and here in the valley of the Dehra Dhoon, which is, I believe, the north-western limit of the wild Elephant, we find the forest along the foot of the hills assuming a more dense and tropical appearance, under the increasing influence of the south-west monsoon, until on the frontier of Nepal it forms a belt of dense and often marshy and unhealthy forest, which is called the Terai or Morung.

A number of species are found in the hills of Kumaon which do not extend as far as Sikim, being there represented by a different form. Among them may be mentioned the following:—

Certhia himalayana.
Sitta leucopsis.
Trochalopteron erythrocephalum.
—— *variegatum.*
Lophophanes melanolophus.
Machlolophus xanthogenys.
Æthopyga horsfieldi.
Ceriornis melanocephalus.
Gallophasis albocristatus.

Nepal.

Still following the line of the mountains in a south-westerly direc-

tion, we come to Nepal, which must certainly be considered one of the most interesting countries to a naturalist in the world. It includes parts of three different zoological provinces, and, having a wonderful variety of climate and vegetation, offers a congenial home to the inhabitants of them all.

To Mr. B. H. Hodgson, for twenty years our resident at the court of Nepal, a naturalist whose name will ever hold a prominent place among men of science, we are indebted for all we know of the zoology of this magnificent country. So well did he use his time and opportunities, that no less than 657 species of birds, a large proportion of which were described by him, are known to occur in the country; and though his hunters travelled far and wide from the plains to the snows, I cannot doubt that there are yet more remaining to reward those who may at some future time be lucky enough to explore this forbidden land, which, though within sight of many of our stations, is as much closed to Englishmen as the most remote parts of Central Asia.

Of its most remarkable features I shall speak more particularly when examining the birds of Sikim; but to give a general idea of the character of the Nepalese avifauna, I will say that there are (without counting the wading and water birds), according to Gray's 'List of Mr. Hodgson's collections,' 2nd edit., 1863, 294 genera, containing 553 species:—

		per cent.
Very wide distribution	62	16
Characteristic of the Palæarctic region.....	30	8
Characteristic of the Indo-Malay region	202	56
Peculiar to or characteristic of the Himalaya	80	20

Of the species, however, no less than 60 per cent. are found only in the Himalayan subregion, except as migrants or stragglers—a proportion which, for the size of the country, is unusually large.

To the east of Nepal lies Sikim, a small state of about 50 miles wide, extending from the plains of Bengal to the passes into Thibet, and forming a sort of buffer between the two turbulent and warlike races of Ghorkas and Bhotias.

Sikim.

Having personally studied the birds of Sikim, and, in company with Mr. Blanford, travelled over a great part of it, which had not been visited since Dr. Hooker's well-known explorations in 1848–49, I shall give a more detailed account of the peculiar features in geographical distribution which it presents. Though such good naturalists as Jerdon, Hodgson, Tickell, and Beavan have resided at Darjeeling and collected largely, the list of birds from this small district is constantly being increased; and from the difficulty of travelling in the interior, and the density of the forests which cover the greater part of it up to 12000 or 13000 feet above the sea, I have no doubt that many years will elapse before the novelties of this country are exhausted.

The Himalaya mountains were divided by Hodgson (see J. A. S. B. 1835) into three zones of elevation, each of which has a more or less distinct fauna; and as these three faunas are characteristic of three different zoological provinces, they are no doubt very natural ones.

The lowest, from the level of the plains up to about 3000 or 4000 feet, including the Terai, is a region of dense jungle, marshy plains at the foot of the hills, steep forest-clad spurs and deep valleys, which preserve the tropical character of their fauna and flora for a long distance into the interior. It is rich in all the most characteristic Indo-Malayan genera, such as Hornbills, Barbets, Kingfishers, Fruit-Pigeons, Bulbuls, and Woodpeckers, the latter in particular being so numerous that, out of eighteen species found in Sikim, all but three occur in the lowest zone. A few representatives of other genera which are more numerously represented in the Malay subregion also occur, as *Hierax eutolmus*, *Harpactes hodgsoni*, *Psarisomus dalhousiæ*, *Pitta cucullata*, *Hydrornis nipalensis*, and *Polyplectron chinquis* (not found west of the Tista). Along the edge of the forest, and where cultivation has encroached on its limits, some of the commoner birds of the plains are found, whilst on the rivers and marshes many wading birds and waterfowl spend the winter. These, however, rarely enter the hills, though they must pass over them at the period of their migrations. Many Warblers which breed in the upper and middle zones descend during the cold weather to the lower hills and plains, wandering over a great part of India, and in some cases, perhaps, breeding in the higher mountains of the peninsula. Several species of *Ruticillinæ*, *Motacillinæ*, and *Cuculidæ* also descend to this zone in winter; but if we exclude the wading and water birds, it has not so many species as the zone above it, the numbers being, as well as I can estimate them, about 130 to 260.

In this zone the fauna is very much the same in character as that of the Malabar coast, Burmah, and Assam, and, though possessing many peculiar species of birds, has hardly any genera which are not also found in those countries.

The transition from the lower zone to the middle is both gradual and irregular, depending much on the peculiarities of different valleys and localities. For instance, at an elevation of 3000–4000 feet in the valley of the little Rungeet, and in that part of the Tista valley which is at a distance from the plains, many of the tropical forms are replaced by birds of the middle zone; but it is on the whole undoubtedly true that the birds of the middle zone from 3000–4000 to 10000–11000 feet have a decidedly different character. Here the forest becomes dark and gloomy; oaks, magnolias, and rhododendrons densely covered with mosses and fern replace the saul trees, plantains, and giant bamboos of the lower region. In many places the mountains from about 7000 to 9000–10,000 feet are covered by a forest of hill bamboo, so dense that it is impossible to go off the beaten path without clearing a way with the knife.

Among these small bamboos, and in the rhododendron-woods which are such a characteristic feature of the middle zone, are found

most of those peculiar and interesting birds so unlike any found elsewhere that their classification has been a constant puzzle to ornithologists. Whole genera, such as *Paradoxornis*, *Yuhina*, *Siva*, *Minla*, *Ixulus*, *Stachyris*, *Leiothrix*, *Pteruthius*, *Allotrius*, *Pnoepyga*, and many isolated forms such as *Acanthoptila*, *Sibia*, *Cutia*, *Lioptila*, *Conostoma*, *Gampsorhynchus*, *Myzanthe*, *Pachyglossa*, *Rimator*, *Grammatoptila*, *Myzornis*, are nearly if not quite restricted to this region, though in winter they are sometimes forced by cold to descend lower in search of food. The habits, nidification, and structure of these birds are at present very little known, and are likely to remain so until some resident, possessing the energy and love of nature which has enabled Mr. Swinhoe to do so much for the birds of China, will devote a few years to their study.

During the rainy season, which lasts from April to the end of October, but few Raptores and Game-birds are found in the middle region. Owing to the great abundance of leeches between 4000 and 9000 feet, no terrestrial birds or other animals are safe from their attacks, and it is not until we reach the region of the dwarf bamboo that any of the Phasianidæ reappear.

In the North-west Himalaya this is not so; for, owing to the difference in climate and vegetation, Pheasants seem to be found at much lower elevations than at Sikim, where the Monal (*Lophophorus*) does not occur below 12,000 feet in summer, and the Tragopan (*Ceriornis*) is rarely seen below 8000 or 9000.

As there are no lakes in this region, and the rivers are rapid torrents, waders and waterfowl are conspicuous by their absence. Pigeons are not numerous; and though the variety of species is so great, birds are not generally so conspicuous or abundant as at lower elevations.

In the interior valleys of Sikim the character of the vegetation at 9000–10000 feet has assumed a different aspect, and is again almost insensibly blended into the upper region, which, though possessing a number of species peculiar to itself, has a strong general resemblance to the Palæarctic region, both in vegetation and zoology.

This zone commences on the outer hills at about 11000 feet, and in the interior at from 8000–10,000, many of the birds belonging to it being driven down in winter to a much lower elevation.

Here the forest is principally composed of coniferæ, shrubby rhododendrons, and a small kind of bamboo, which in some places reaches an elevation of 12,000 feet. The valleys become more open, though it is not until we get above the limit of trees at 12,000–13,000 feet that any really open country is found, the hill-sides of the lower and middle regions being almost without exception steep and wooded, except where cultivation has destroyed the forest.

Warblers of the genera *Phylloscopus*, *Reguloides*, and *Abrornis*, mingled with several species of *Paridæ*, are the most abundant birds in these pine-woods. The Blood-Pheasant (*Ithaginis cruentata*), Wood-Pigeon (*Alsocomus hodgsoniæ*), and many Ruticilline birds, such as *Ianthia*, *Tarsiger*, and *Ruticilla*, are commonly seen. Finches of many genera, especially *Propasser*, *Carpodacus*, and

Pyrrhula, breed here in company with the Warblers and Titmice; but the Timaliine birds, with the exception of *Trochalopteron affine*, which reaches 13,000 feet, have all disappeared, as well as the *Liotrichinæ* of Jerdon. Above the limit of forest, birds become scarcer; and when we reach 15,000 feet, the only ones which are commonly met with are *Accentor nipalensis*, *Fringalauda nemoricola*, Hoopoes, two species of *Cinclus*, Ravens (*Corvus corax=tibetanus*, Hodg.), *Lerwa nivicola*, and that most magnificent of all alpine birds *Grandala cœlicolor*. *Æthopyga ignicauda* breeds in this region as high as 11,000 feet; and the little Nepalese Wren, *Troglodytes nipalensis*, creeps about rocky hill-sides at 12,000–14,000 feet; *Columba leuconota* occurs in large flocks at from 11,000–14,000 feet in the valleys of the interior, but like many other birds of this region, such as the Lammergeyer, Chough (*Fregilus graculus*), and Raven, is not found on the outer hills.

The number of birds which belong to this region in Sikim is not more than 50 or 60 according to my experience; but it will require a great deal more observation to decide the exact range of many species, which no doubt varies greatly in different parts of the mountains.

My remarks on this subject must therefore not be taken as conclusive, though I was careful to note the elevation of every specimen I procured as accurately as possible.

The highest level at which I observed birds was about 17,500 feet, where *Grandala cœlicolor* and *Ruticilla erythrogastra* were found; *Accentor rubeculoides* and *A. nipalensis* attained very nearly the same level; and many other birds no doubt occasionally come as high as this, which is nearly the limit of flowering plants on the south side of the range.

Having thus roughly defined the three zones of elevation in Sikim, I will give the results of an analysis of the birds which I know to have been obtained there. A large proportion of them I collected myself; and for others I am indebted to the kindness of Mr. Mandelli of Darjeeling, whose collection of the birds and insects of this country is probably the richest ever made.

Excluding the Raptores, of which my list is very incomplete, as well as the Grallæ and Anseres, I find 423 species, of which 270 are not found out of the Himalayan region, except as migrants or stragglers.

		per cent.
Genera of very wide range	63	15
Genera peculiar to or highly characteristic of the Himalayan subregion	146	34
Genera peculiar or nearly so to the Indo-Malay region	154	36
Palæarctic genera	60	15

Asam.

I will now pass on to the mountain-ranges surrounding the valley of Asam, which, being as yet very little known, may be expected to produce many fine novelties of the same character as the birds we

have just noticed as being so abundant in the upper and middle region of Sikim. The Mishmi hills in particular will well reward exploration. Through the agency of its savage inhabitants, one of the most curious animals in the world, *Budorcas taxicolor*, as well as two splendid Pheasants, *Lophophorus sclateri* and *Ceriornis blythii*, have already been brought to light; and the numerous discoveries of the Abbé David to the north-east show how much remains to be done in this direction. Of the Khasia and Cachar hills we have a fair knowledge, Major Godwin-Austen having published, in the J. A. S. B. for 1870, two excellent papers on their ornithology.

They show but little difference from the hills of corresponding elevation in Sikim, though a few genera, such as *Turdinus*, *Rhyticeros*, and *Anthreptes*, which are not found in the Himalaya, occur here.

The number of Asamese species not found in Sikim is only 16, of which half are Burmese birds.

Burmah.

Passing by the Lushai hills, which, though traversed by a large force of troops in 1871, are still quite unknown to naturalists, we come to Burmah, Aracan, and Tennasserim. Of the countries lying east of the Bay of Bengal I should have been able to say but little had it not been for the kindness of Mr. Blyth, whose knowledge of their natural history is unequalled.

He has, however, allowed me to make use of a list of birds which was prepared for Sir A. Phayre's promised work on British Burmah, and which consolidates and reviews all the scattered notices which have appeared at different times in the pages of the J. A. S. B. and other publications.

This list extends to above 500 species; and as the country to which it refers is too large to be taken as a whole, I have divided it into two parts, with the view of ascertaining what relation they bear respectively to India and the Malay peninsula.

The northern division, which includes Aracan, Pegu, and valley of the Irrawaddy, has been fairly explored—Tickell, Blyth, Blanford and Jerdon being the names best known in connexion with its ornithology.

Much remains to be done in the hills of the interior, where many additional Himalayan species may probably be found, though a great number of them have already been obtained in various parts of the country. On the whole, the fauna of Burmah is remarkably similar to that of Eastern Bengal, nearly all the genera being the same, and many of the species which have been described under different names being extremely close to their Indian representatives.

In the valley of the Irrawaddy above Pegu the country becomes much dryer and less wooded; and here, as was pointed out by Mr. Blanford (Ibis, 1870, p. 463), are found several peculiar species and others which do not occur in Lower Burmah. Among them may be mentioned *Chatarrhæa gularis*, *Pericrocotus albifrons*, *Leucocerca albofrontata*, *Pica media*, *Monticola saxatilis*, *Pratincola*

leucura, Palæornis torquatus, Passer assimilis, Temenuchus burmannicus, Francolinus phayrei, Oxylophus jacobinus.

Of the Irrawaddy north of Bhamo we know nothing; but it may be safely assumed that the character of the avifauna becomes more and more Himalayan as the great mountains which hem it in on the north and west are approached.

The birds collected by Dr. Anderson on the hills between Burmah and Yunnan prove to a certain extent that this is the case, and make us very anxious to know more about them.

In Mr. Blyth's list, I find, if the waders and water-birds are omitted, that about 363 species are recorded.

		per cent.
Common to India and the Malay peninsula	97	26·5
Found in India	193	53·5
Found in the Malay peninsula	27	7·5
Peculiar to Burmah, or Burmah and Tennasserim	46	12·5

Thus it appears that in Burmah, Aracan, and Pegu the Indian birds are to the Malayan as 7 to 1, a much larger proportion than I should have expected.

Some of the most remarkable of the species peculiar to this region are:—

Rhyticeros plicatus, Bl.
Megalaima cyanotis, Bl.
Mulleripicus crawfurdi, Gr.
Gecinulus viridis, Bl.
Lyncornis cerviniceps, Gould.
Crypsirhina cucullata, Jerd.
Pitta cyanea, Bl.
Anthocincla phayrei, Bl.
Culicipeta tephrocephalus, Bl.
Muscitrea cinerea, Bl.
Sitta neglecta, Walden.
Pomatorhinus hypoleucos, Bl.
Pyctorhis albirostris, Jerd.
Ixos blanfordi, Jerd.
Iora lafresnayi, Hartl.
Temenuchus burmannicus, Jerd.
—— *nemoricola*, Jerd.
Passer flaveolus, Bl.
Arachnothera aurata, Bl.
Polihierax insignis, Walden.
Francolinus phayrei, Bl.
Turnix blanfordi, Bl.

Tennasserim.

The Tennasserim provinces, which, as I here take them, extend from about the latitude of Martaban to the isthmus of Krau, though very similar to Burmah, show, as might be expected, a marked diminution of Indian birds and a corresponding increase of Malayan ones.

This is more particularly the case in the mountains of the south, where Col. Tickell, the only naturalist I am aware of who has visited these hills, found, besides other Malay forms, no less than 7 of the 9 known species of Broadbills (*Eurylæmidæ*), a family which is only represented in the Himalaya by 2 species.

In the same hills, however, which reach an elevation of about 7000 feet, Col. Tickell got new species of *Trochalopteron, Pomatorhinus, Pteruthius, Sibia, Garrulax*, and *Machlolophus*, all showing a strong affinity with the Eastern Himalaya. This leads me to

expect that the fauna of mountains of the interior of Siam, Anam, and Cambodia, of which I am unable to say any thing from want of information, will be found to have the same affinity with the Himalayan fauna.

The number of birds recorded from the Tennasserim provinces by Mr. Blyth is about 313.

		Per cent.
Common to India and the Malay peninsula ..	93	30
Found in India	117	37
Found in the Malay peninsula	56	18
Peculiar to Tennasserim, or Tennasserim and Burmah	47	15

Among the most remarkable of these peculiarities are :—

Hierax fringillarius.
Anarhinus tickelli, Bl.
Ampeliceps coronatus (also found in Siam).
Sturnus nigricollis.
Garrulax belangeri, Less.
—— *strepitans*, Tickell.
Pteruthius æralatus, Tickell.
Machlolophus subviridis, Tickell.
Pomatorhinus albogularis.
Trochalopteron melanostigma, Bl.
Pellorneum tickelli, Bl.
Turdinus crispifrons.
—— *guttatus.*
—— *brevicaudatus.*
Hemipus obscurus.
Serilophus lunatus.
Cymbirhyncus affinis.
Hypsipetes tickelli, Bl.
Criniger ochraceus, Moore.
Crocopus viridifrons, Bl.
Arboricola brunneipectus, Bl.

Andaman Islands.

The birds of the Andamans have been made the subject of so recent and careful a paper by Mr. Ball ('Stray Feathers,' part ii.), that I need not say much about them. Lord Walden has also added a paper in the Ibis, 1873, p. 296, in which he gives it as his opinion that the birds of Andaman resemble in character those of the highlands of peninsular India rather than those of the Malayan or Indo-Chinese countries. I must confess my inability to discern any thing particular of a highland character in the avifauna, which I should have said was rather that of the opposite coast of Pegu. Many genera which are common in Burmah, however, seem wanting here, especially Hornbills, Pittas, Broadbills, and Timaliine birds. This is the more remarkable, as the Andamans seem to be densely clothed with forest, and have a large number of species which are unknown elsewhere.

At least a quarter of the land-birds seem to be peculiar to the islands, an unusually large proportion when their situation is considered; but it is quite probable that some of these may prove to have no constant distinguishing characters.

Only two Woodpeckers are found, both peculiar to the islands; but two species of *Graucalus*, as well as seven Pigeons and seven Kingfishers, among a total of about 110 species, show that the avifauna of the Andamans is by no means meagre.

In the Nicobars, not more than about 30 land-birds are yet known, among which *Calœnas nicobarica* and *Megapodius nicobariensis* are most remarkable. Neither of these birds is known to inhabit any other island in the Indo-Malay region, *Megapodius* being quite of an Austro-Malay type.

The birds of Nicobar are much more Malayan than those of Andaman, only about one quarter being common to India, while nearly half are peculiar *.

East Tibet.

The researches of that enthusiastic naturalist and traveller the Abbé Armand David have recently added enormously to our knowledge of Chinese zoology. In no locality has he discovered so many new, curious, and interesting birds and mammals as in Moupin, a district which he tells me is on the borders of Tibet and Szechuen, and, if I understood him rightly, some distance north-west of Ta-tsien-lo, where a missionary station has been established for many years. During eight months that he collected in this neighbourhood he obtained about 40 new species of birds, and a number of new mammalia, which include some of the most anomalous and interesting forms in the whole of Asia. Among them may be cited *Ailuropus melanoleucos*, M.-Edw., *Arctonyx obscurus*, M.-Edw., *Rhinopithecus roxellana*, M.-Edw., *Elaphodus cephalopus*, M.-Edw.; but though, as in other cases, the mammalia fully bear out the conclusions I have formed from a study of the birds, I do not intend to say more about them, except that I believe such an interesting and novel collection was never previously obtained in so short a time.

With regard to the physical features of Moupin, we have far less information than would be desirable; but from what Père David told me, and from what Mr. Cooper says of the country he passed through to the south †, I imagine that it must strongly resemble the interior valleys of the eastern Himalaya. Rhododendrons, bamboos, and conifers are marked features in the scenery; and in consequence almost all the birds which in Sikim are most characteristic of those types of vegetation are either present or represented by nearly allied species.

The similarity between the faunas of Moupin and Sikim is most remarkable, and, in connexion with Mr. Swinhoe's recent discoveries in the hills of China, explains what would have otherwise been very

* A recent paper by Mr. Hume in 'Stray Feathers,' pt. v., on additional species of birds from the Andamans, adds a considerable number to Mr. Ball's list. Among the six new species described one is most remarkable, viz. *Rhyticeros narcondami*. This Hornbill, which appears to be a dwarf form of *Rhyticeros ruficollis*, has only been found on the small island of Narcondam; while the family to which it belongs is unrepresented in any of the other islands; it is the only Asiatic Hornbill peculiar to one island, and almost the only one which has not a very considerable range.

Most of the other birds mentioned by Mr. Hume are local forms of well-known species, or migrants of very wide range.

† Travels of a Pioneer of Commerce, London, 1871.

hard to account for, viz. that the animals of Formosa should be, almost without exception, generically the same as those of the Himalaya.

We now see that the Himalayan range is not, as it seemed to be, an isolated range of mountains, possessing a fauna of its own, but simply the boundary of a vast tract of mountainous country extending over the whole of Southern China and Indo-China, and showing, wherever its elevation exceeds about 4000 feet, the same peculiar forms. It is, *par excellence*, a region of mountains; for wherever cultivated plains of low elevation are found, there the birds of the forest and the mountain disappear, and are poorly replaced, as in India and Eastern China, by other more wide-spread and well-known genera.

This region is the headquarters of the *Phasianidæ*, the *Timaliidæ*, and *Leiotrichinæ* of Jerdon, and is, compared with most parts of the world, very poor in Raptores and Grallatores.

Out of 170 species of birds obtained in or near Moupin by Père David, only 9 (namely, *Picoides funebris*, *Coccothraustes vulgaris*, *Chlorospiza sinica*, *Eophona personata*, *Thaumalea amherstiæ*, *Crossoptilon tibetanum*, *Tetraophasis obscurus*, *Cholornis paradoxa*, and a genus allied to *Pnoëpyga* and *Troglodytes*) are of genera not found in the Himalaya; 61 belong to genera either peculiar to or highly characteristic of those mountains; only 21, or about 12 per cent., belong to genera common to the whole of the Indo-Malay region,—showing that, as far as our present knowledge extends, Moupin, though not so rich in species as Sikim or Nepal, is, from the absence of a low flat plain like the Terai, a district more characteristic of the Himalo-Chinese subregion than any part of the Himalaya itself.

Among the most curious birds found here may be mentioned *Cholornis paradoxa*, Verr., a bird so like *Heteromorpha unicolor*, Hodgs., that if the feet were cut off I do not think it could be distinguished. It has, however, the outer toe aborted in such a peculiar way, that it has been made by its describer the type of a new genus. This bird seems to have the same habit of skulking in dense jungle of hill-bamboo that I have observed in *Paradoxornis*, *Heteromorpha*, and *Suthora*.

Pnoëpyga troglodytoides, Verr., is another curious bird, doubtfully assigned to that genus by its describer, and very different in appearance from any *Pnoëpyga* I have seen.

Many species previously only known from the Himalaya were found at Moupin by M. David,—among them *Grandala cœlicolor*, Hodgs., *Cinclus cashmeriensis*, Gould, *Lerwa nivicola*, Hodgs., and *Accentor nipalensis*, Hodgs.—all birds which I have only seen at elevations above 14000 feet in Sikim. Coupling with this the absence of Barbets, Fruit-Pigeons, Trogons, Hornbills, and the tropical genera of Woodpeckers (all birds which are found as high as 5000 or 6000 feet in Sikim), I conclude that the lowest valleys in this part of Thibet are of a much more alpine nature than in Sikim, and subject in winter to a more severe climate.

Certhia himalayana, which I have examined and compared with the

same bird from N.W. Himalayas, presents a most curious fact in geographical distribution, as it is replaced in Nepal and Sikim respectively by *Certhia nipalensis* and *C. discolor*, while here, at a distance of 1000 miles or more from its nearest known habitat, the same identical form reappears. The solution of this problem will, I think, puzzle far wiser heads than mine; for though it is easy by an imaginary submergence and reappearance of land to account for almost any thing where islands are concerned, the only reason I can suggest for the occurrence of *Certhia himalayana* in Moupin is that it is a northern species inhabiting the unknown Tibetan mountains to the north of the Himalaya, and only reaching Cashmere by a circuitous route.

Several species, such as *Trochalopteron blythii*, Verr., *Paradoxornis guttaticollis* and *Allotrius sophiæ*, differ so slightly from their Himalayan representatives, that I should hardly like to separate them without a large series for comparison; but the many other fine species which I have noted below are more than sufficient to support the scientific fame of their discoverer and describer, MM. David and Verreaux, to whom I am much indebted for the kindness with which they have allowed me to examine and compare these unique specimens in the Paris Museum.

New species discovered in Moupin by Père David:—

Picoides funebris, J. Verr.
Picus desmursii, J. Verr.
Siphia hodgsoni, J. Verr.
Merula gouldii, J. Verr.
Turdus auritus, J. Verr.
Trochalopteron ellioti, J. Verr.
—— *formosum*, J. Verr.
Ianthocincla lunulata, J. Verr.
—— *maxima*, J. Verr.
—— *lanceolata*, J. Verr.
Calliope pectardens, A. David.
Pnoëpyga? troglodytoides, J. Verr.
Lusciniopsis brevipennis, J. Verr.
Arundinax davidiana, J. Verr.
Phyllopneuste trinotaria, A. David.
Abrornis acanthizoides, J. Verr.
Minla jerdoni, J. Verr.
Proparus ruficapilla, J. Verr.
—— *cinereiceps*, J. Verr.
—— *striaticollis*, J. Verr.
—— *swinhoei*, J. Verr.
Mecistura fuliginosa, J. Verr.
Alcippe? pœcilotis, J. Verr.
Accentor multistriatus, A. David.
Yuhina diademata, J. Verr.
Cholornis paradoxa, J. Verr.
Suthora alphonsiana, J. Verr.
—— *gularis*, J. Verr.
Carpodacus trifasciatus, J. Verr.
—— *verreauxii*, A. David.
Tetraophasis obscurus, J. Verr.
Lophophorus lhuysii, J. Verr.
Phasianus decollatus, Swinh.
Ithaginis geoffroyi, J. Verr.

Species found in Moupin only known previously from Himalayas:—

Glaucidium brodiæi.
Syrnium nivicolum.
Certhia himalayana.
Vivia innominata.
Cuculus himalayanus.
Eumyias melanops.
Siphia strophiata.
Culicipeta burkii.
Ianthia superciliaris.
Pratincola ferrea.
Chæmarrornis leucocephala.
Ruticilla fuliginosa.
—— *hodgsoni.*
—— *frontalis.*

Grandala cœlicolor.
Oreocincla mollissima.
Trochalopteron blythii=affine?
Suya striata.
Tribura luteiventris.
Hodgsonius phœnicuroides.
Tarsiger chrysæus.
Pnoëpyga squamata.
Abrornis affinis.
Regulus himalayanus.
Lophophanes dichrous.
—— *castaneiventris?*
Allotrius xanthochloris.
Alcippe cinerea=nipalensis?
Accentor nipalensis.
—— *immaculatus.*
Yuhina nigrimentum.
—— *gularis.*
Paradoxornis guttaticollis=flavirostris?
Heteromorpha unicolor.
Conostoma æmodium.
Henicurus scouleri.
Cinclus cashmeriensis.
Nucifraga hemispila.
Garrulus bispecularis.
Fringilauda nemoricola.
Procarduelis nipalensis.
Carpodacus edwardsii?
Pyrrhula erithacus.
Mycerobas melanoxanthos.
Hesperiphona affinis.
Alsocomus hodgsoni.
Macropygia tusalia.
Lerwa nivicola.

Formosa.

Owing to the residence of Mr. Swinhoe in the island of Formosa for a considerable time, the ornithology of that island has been very thoroughly explored; and though it is quite possible that in the highest mountains of the interior some novelties still remain undescribed, we possess a more accurate knowledge of the birds of this island than of any other in the east, except perhaps Ceylon. The climate and physical geography, as described by Mr. Swinhoe, seem to resemble those of the E. Himalayas considerably; and it is no doubt partly owing to the heavy rainfall and forest-clad mountains that the zoological resemblance is so striking.

An examination of the list of birds which was given by Mr. Swinhoe in the 'Ibis' for 1863, and increased by his later additions in the List of Chinese Birds (P. Z. S. 1871, p. 337), shows that, with the exception of four genera, three of which are peculiar to China and one peculiar to the island, every genus found in Formosa is also found in the E. Himalayas.

Many genera which are not found in the Malayan subregion, as *Herpornis*, *Sibia*, *Suthora*, *Urocissa*, *Suya*, *Spizixos*, appear in the mountains of Formosa, as well as others, such as *Pomatorhinus*, *Garrulax*, *Alcippe*, *Myiocincla*, *Myiophonus*, which are much more characteristic of the Himalayan than of the Malayan subregion.

The number of peculiar species is considerable, and shows that Formosa has probably been separated from the mainland for a long period.

I have annexed a list of these species, gathered from Mr. Swinhoe's papers, with the nearest allies of many of them, in order to show the close affinity which Formosa has to Sikim. An examination of the list of Formosan birds shows 144 species belonging to 102 genera:—

Genera found in the Himalayan subregion	98
Genera found in the Malayan subregion	70

Species belonging to genera of very wide distribution.....	74
Species not found in the Malayan subregion	18
Species belonging to genera common to the two subregions..	47
Species belonging to genera peculiar to or characteristic of the Himalayan subregion	18
Species belonging to genera peculiar to or characteristic of China	5

Birds peculiar to Formosa, from Swinhoe's papers:—

Athene pardalota	allied to	*A. brodiæi.*
Caprimulgus stictomus	,,	*C. monticola.*
Ephialtes hambroeckii	,,	*E. lempiji.*
Turdus albiceps.		
Chaptia brauniana.....	,,	*C. ænea.*
Myiophonus insularis.....	,,	*M. horsfieldii.*
Pitta oreas.		
Garrulax ruficeps	,,	*G. albogularis.*
—— *pœcilorhynchus*	,,	*G. cærulatus.*
Pomatorhinus musicus	,,	*P. ruficollis.*
—— *erythrocnemis.*		
Hypsipetes nigerrimus	,,	*H. psaroides.*
Spizixos cinereicapillus	,,	*S. semitorques.*
Alcippe morrisonia..... ..	,,	*A. nipalensis.*
—— *brunnea.*		
Parus insperatus	,,	*P. monticola.*
—— *castaneiventris*.....	,,	*P. varius.*
Suthora bulomachus.		
Sibia auricularis	,,	*S. capistrata.*
Horeites robustipes.....	,,	*H. assimilis.*
Megalæma nuchalis.		
Picus insularis	,,	*P. leuconotus.*
Garrulus taivanus	,,	*G. bispecularis.*
Dendrocitta formosæ	,,	*D. sinensis.*
Urocissa cærulea.		
Myiomela montium.....	,,	*M. leucura.*
Leucodiopteron taivanum.		
Treron formosæ	,,	*T. sieboldii.*
Chalcophaps formosana.		
Sphenocercus sororius.		
Euplocamus swinhoei.		
Turnix rostrata	,,	*T. ocellatus.*
Bambusicola sonorivox	,,	*B. thoracica.*
Munia formosana.		

Hainan.

The only knowledge we have of the birds of Hainan was obtained by Mr. Swinhoe during a period of about two months in 1868; and though it seems but a short time for the exploration of so large an island, yet the results show how much can be accomplished by a really enthusiastic and experienced naturalist.

A glance at the list of birds obtained by him will show what might

have been expected, viz. that the number of peculiar species is not so large as in Formosa, and that the Himalayan element, though still decidedly strong, is not so marked as in that island. No doubt in the mountains of the interior (which rise to a height of 7000 feet) many unknown birds of Himalayan affinities are found; for as in the fourteen days that Mr. Swinhoe spent among them a large proportion of new species were procured, any one who has had experience of collecting in tropical forests will know that a good many more must have escaped his gun.

The following species, only hitherto found in Formosa, also occur in Hainan:—*Picus kaleensis, Graucalus rexpineti, Psaropholus ardens.*

The following common Indo-Malayan genera occur in Hainan, but are wanting in Formosa—*Æthopyga, Arachnechthra, Dicæum, Micropternus, Palæornis, Zanclostomus, Centropus, Artamus, Macropygia, Carpophaga*; whilst the following, found in Formosa, are absent in Hainan (all, it will be observed, of Palæarctic or Himalayan type, except the last two, which very possibly exist in Hainan also)—*Myiophonus, Sibia, Alcippe, Myiomela, Chaptia, Suya, Sitta, Urocissa, Garrulus, Palumbus, Horeites, Bulaca, Cinclus, Phasianus, Ampelis, Gecinus, Pitta, Euplocamus.*

An examination of the list of birds collected in Hainan by Mr. Swinhoe ('Ibis,' 1870) shows 130 species, belonging to 96 genera, of which 86 genera, or 89 per cent., are also found in the Malayan subregion, and all but three (namely, *Xanthopygia, Cyanoptila,* and *Leucodiopteron*) in the Himalaya.

54 species belong to genera of very wide distribution;
59 species belong to genera characteristic of the Indo-Malay region;
16 species belong to genera characteristic of the Palæartic region.

The following species are peculiar to Hainan:—

Cypselus tinus	allied to	*C. batassiensis.*
Micropternus holroydi	,,	*M. fokiensis.*
Megalæma faber	,,	*M. nuchalis.*
Æthopyga christinæ.		
Arachnechthra rhizophoræ	,,	*A. flammaxillaris.*
Dicæum minullum.		
Volvocivora saturata.....	,,	*V. lugubris.*
Buchanga innexa	,,	*B. leucogenys.*
Garrulax monachus		
Pomatorhiuus nigrostellatus	,,	*P. stridulus.*
Hypsipetes perniger	,,	*H. nigerrimus.*
Hemixus castanonotus	,,	*H. flavala.*
Criniger pallidus	,,	*C. flaveolus.*
Ixus hainanus	,,	*I. sinensis.*
Phyllornis lazulina	,,	*P. hardwickii.*
Herpornis tyrannulus	,,	*H. xantholeuca.*
Osmotreron domvillei.....	,,	*O. bicincta.*

Indian Subregion.

We now come to that part of the Indo-Malay region which, as I previously said, is remarkable for the absence or comparative scarcity of many of the principal Malay groups, and which I term the Indian subregion.

Mr. Blanford, when considering the geographical distribution of Indian reptiles (see J. A. S. B. 1870), and influenced, no doubt, by his knowledge of other branches of natural history, divides India into four provinces. One of these, his eastern Bengal province, including Lower Bengal, Assam, and Cachar, should, as he justly says, be classed with the Indo-Chinese countries, and therefore included in the Himalo-Chinese subregion. A second, called by him the Punjab province, includes the most arid and treeless parts of India—that is to say, the Punjaub, Scinde, the trans-Indus provinces, western Rajputana, and Cutch. This, though tinged more or less with the Malay element, and possessing most of the genera peculiar to the Indian subregion, has such a large proportion of Palæarctic and desert-haunting species, that, though it is desirable to include it in the Indian subregion, it must be regarded as a border-land separating the Indo-Malay from the Palæarctic region, as that is separated from the Ethiopian by the deserts of Libya and the Sahara.

Mr. Blanford's other two divisions, in which I entirely concur, are as follows:—

The Indian province proper, including all India east of Delhi and Kathiawar as far as the Rajmahal hills, and the whole peninsula south of the Ganges, with the exception of the western coast and some scattered hills in Southern India.

The Malabar province, including all the western coast from Bombay to Cape Comorin, and the whole of the mountains running parallel to that coast probably as far as the Taptee, also the greater part of Ceylon.

It should be observed that, in the opinion of some, the special features which Ceylon affords in some branches of zoology would entitle it to be ranked as a separate subregion. This, however, would not be desirable in an ornithological sense, as it does not, as far as I am aware, contain a single genus peculiar to the island, though it has some remarkable points in common with the Malayan and Himalayan subregions.

Ceylon.

The birds of Ceylon have been ably worked out by Mr. Holdsworth in the P. Z. S. for 1872; and the list which he gives, numbering 325 species, probably includes almost every species inhabiting the island.

Deducting the Grallæ and Anseres, as usual, we have 225 birds from which to form an opinion as to the zoogeographical affinities of Ceylon, and, from an examination of the list, get the following results:—

Species belonging to genera common to the Himalayan and Malayan subregions	175
Species belonging to genera found in the Himalayan but not in the Malayan	30
Species belonging to genera found in Malayan but not in Himalayan	6
Species belonging to Indian genera	14
	225

Species peculiar to the island	37
Species only found in Southern India	37
Wide-ranging species	68
Found either in India only or ranging to Malayana and China	83
	225

Though the large number of birds peculiar to Ceylon shows that it has probably been separated for a long period, yet the resemblance of its avifauna to that of Southern India is so strong that it does not bear out Sir J. E. Tennent's belief that it originally formed part of a lost Malayan continent.

Only four species belong to genera not found in S. India; and it is quite possible that, when the extreme south of the peninsula is better known, even these may be found. The occurrence of *Arrenga* is very remarkable; for, as far as we know, the only other species referred to that genus is peculiar to the mountains of Java; and though nearly allied to *Myiophonus*, which is found in all the mountains of the Indian region, yet the generic distinction is sufficiently well marked. I will here mention some of the genera found in Ceylon which are remarkable on account of their distribution:—

Genera found in Himalayas, but not in Malayana.

Aquila.	*Larvivora.*
Nisaetus.	*Cyanecula.*
Buteo.	*Phylloscopus.*
Circus.	*Sylvia.*
Picus.	*Temenuchus.*
Brachypternus.	*Crocopus.*
Hemipus.	*Alsocomus.*
Cryptolopha=Myialestes.	*Palumbus.*
Alseonax.	*Columba.*
Turdulus.	*Francolinus.*
Merula.	*Perdicula.*

Found in the Malayan but not in the Himalyan subregion.

Batrachostomus.	*Prionochilus.*
Phœnicophæus.	*Arrenga.*
Nectarophila.	*Drymocataphus.*

Found only in India.

Tockus.	*Layardia.*
Taccocua.	*Kelaartia.*
Piprisoma.	*Thamnobia.*
Ochromela.	*Pastor.*
Pyctorhis.	*Pyrrhulauda.*
Dumetia.	*Galloperdix.*
Malacocercus.	*Ortygornis.*

Southern India.

We will now see what are the most notable peculiarities in the avifauna of Southern India.

The birds of this province are fairly known from the writings of the late Dr. Jerdon, the greater part of whose service in India was spent in the Madras presidency; and though some parts of the country, especially the Travancore mountains and the hilly district lying along the coast between the Mahanuddy and Godavery rivers, have as yet been hardly visited by naturalists, and may be expeeted to yield some new forms, yet enough is known of the country to give a very good idea of its natural productions.

As far as we know, most of the birds peculiar to the Malabar coast and the Westeru Ghauts have a considerable range of latitude, though some of those which are restricted to the highest hills are only found to the south of about lat. 12° N., where several tracts of mountainous country, such as the Neilgherries, Pulneys, Annamullays, and Cardamom hills, reach an elevation of 8000 feet. The upper parts of these hills are principally open, but are in places covered with a luxuriant forest and shrubbery of trees; and to these woods are restricted several of the forms whose geographical distribution is so peculiar, such as *Trochalopteron cachinnans*, *T. jerdoni*, and *T. fairbanki*, *Ochromela nigrorufa*, *Larvivora cyana*, and *Hypsipetes neilgherriensis*.

The western slopes of the Ghauts from Cape Comorin northwards are covered in most parts with luxuriant tropical forest, and inhabited by many of the typical Himalayan and Malayan forms, such as *Nyctiornis*, *Homraius*, *Alcippe*, *Pomatorhinus*, *Myiophonus*, *Irena*, *Harpactes*.

On their eastern side the mountains south of the Neilgherries descend very abruptly into the plains of the Carnatic, where, except on such outlying hills as the Shevaroys and Siramullays, forest is almost entirely wanting. On these plains, as well as on the tableland which forms the greater part of Mysore and the Deccan, the absence of nearly all the forest birds is but poorly compensated by the presence of such genera as *Mirafra*, *Agrodroma*, *Pyrrhulauda*, *Drymoipus*, *Chatarrhæa*, *Pterocles*, *Ortygornis*. The whole number of birds found in Southern India is small, considering the extent and variety of country; and it is probable that not more than half of those included in the list could be obtained in any one locality.

Deccan.

The Deccan, or tableland of Hindostan, which, in Mr. Blanford's division, forms a subprovince of the Indian province proper, is the next to which I shall direct attention, though I am not well acquainted with its northern and eastern boundaries.

The list of Deccan birds is founded on Sykes's list in this Society's 'Proceedings' for 1832, with such additions and corrections as I have been able to gather from other sources. Some of the birds he includes (which are only found in the forests of the Malabar coast and Mahableshwar hills) I have omitted. The country usually called the Deccan is a tableland of moderate elevation broken in many places by rocky hills, which rise a few hundred feet above the plain, and are covered with a low thorny scrub or jungle and stunted trees. I am not aware that forests of any size or importance occur in any part of this region; and in consequence the avifauna is poor and wanting in variety. The number of common and resident birds is small, not more than about 150 land-birds being included in Sykes's list.

The proportion of Indo-Malay genera is far smaller than in Malabar; and a good many birds typical of the dry and barren part of India, S.W. Asia, and N.E. Africa here make their appearance, though, as I have previously said, their number is not sufficient to outweigh the others.

An analysis of the list gives the following result:—

		per cent.
Birds common or belonging to genera common to the Himalayan and Malayan subregions	105	55
Birds belonging to genera found in the Himalayan, but not in the Malayan subregion	27	14
Birds belonging to wide-ranging genera, but only found in India, or belonging to genera peculiar to the Indian subregion	28	15
Birds belonging to genera of African or Palæarctic affinity	30	16

Five or six species which cannot be placed under either of these heads are omitted.

As compared with many parts of India, the scarcity of Woodpeckers in the Deccan is most remarkable, only one species (*Picus mahrattensis*) being at all common—whilst in the Bhotan Terai and hills of Sikim they are so numerous that I obtained no less than 18 species, 7 of which I shot one evening in about an hour's walk round my tent. Curiously enough no *Saxicola* is recorded by Col. Sykes, though Jerdon observed 3 species at Mhow.

Larks are abundant in this region, some peculiar forms (such as *Ammomanes phœnicura*) having their headquarters here. Game-birds are also numerous. No less than 3 species of *Perdicula*, a genus only found in India, occur; and both species of *Galloperdix* are included by Col. Sykes, as well as *Eupodotis edwardsi* and *Sypheotides auritus*.